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Task 2.3.1R

Sacramento to Bakersfield High-Speed Train Alignments/Stations Screening Evaluation

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August 23, 2001

S.0 SUMMARY

Following adoption of a *Final Business Plan*¹ in 2000, the California High-Speed Rail Authority (Authority) recommended the state proceed with implementation of a statewide high-speed train system by initiating the formal state and federal environmental review process through the preparation of a state program-level Environmental Impact Report (EIR) and a federal Tier I Environmental Impact Statement (EIS) or Program EIR/EIS. The Authority is the state lead agency for the California Environmental Quality Act (CEQA) and the Federal Railroad Administration (FRA) is the federal lead agency for the National Environmental Policy Act (NEPA). As part of the Program EIR/EIS, a number of project alternatives will be evaluated including a High-Speed Train Alternative. Within the High-Speed Train Alternative, there is a range of high-speed train alignment and station location options to be considered.

The purpose of this High-Speed Train Alignments/Stations Screening Evaluation is to consider all reasonable and practical options within the Sacramento to Bakersfield corridor at a consistent level of analysis and focus the Program EIR/EIS on those alignment and station options that best attain the following objectives established by the Authority.

- Maximize Ridership/Revenue Potential
- Maximize Connectivity and Accessibility
- Minimize Operating and Capital Costs
- Maximize Compatibility with Existing and Planned Development
- Minimize Impacts to Natural Resources
- Minimize Impacts to Social and Economic Resources
- Minimize Impacts to Cultural Resources
- Maximize Avoidance of Areas with Geological and Soils Constraints
- Maximize Avoidance of Areas with Potential Hazardous Materials

This alignment and station screening evaluation was accomplished through the following key activities.

- Confirmation/reconsideration of past alignment and station decisions based on review of previous studies.
- Identification of alignment and station options not previously evaluated through meetings with elected officials and public agencies and through the environmental scoping process.
- Evaluation of alignment and station options using standardized engineering, environmental, and financial criteria and evaluation methodologies.
- Identification of the alignment and station options ability to attain defined objectives.

S.1 ALIGNMENT AND STATION OPTIONS STUDIED

The Sacramento to Bakersfield corridor was divided into seven segments for analysis purposes. These segments include:

1. Sacramento to Stockton
2. Stockton to Modesto
3. Modesto to Merced
4. Merced to Fresno
5. Fresno to Tulare
6. Tulare to Bakersfield
7. Bakersfield to Los Angeles Connections.

¹ California High-Speed Rail Authority. *Building a High-Speed Train System for California, Final Business Plan*. June 2000.

The alignment and station location options within these segments are summarized below and illustrated in Figures S.1.0 through S.1.7, following the text.

All Central Valley alignments are composed of line segments from four general categories. High-speed rail alignments either follow the two existing rail corridors on adjacent rights-of-way or they follow new alignments in open territory through the Valley. The existing rail corridors are designated as **SP/WP** (old Southern Pacific or Western Pacific, now operated by Union Pacific) and **BNSF** (Burlington Northern and Santa Fe Railway). The new alignments run through new territory either west of State Highway 99 (**W99**) or east of it (**E99**). Numerous combinations of these line segments can be constructed throughout the roughly 270 miles of territory between Sacramento and Bakersfield. **Connectors** to allow combinations of the elements of each of these four general categories within and among the seven segments are designed to provide either high-speed non-stop through routes among the four categories or lower speed stopping tracks to stations that cannot be located on high-speed through routes because of physical, operating or environmental constraints in the urban station areas.

The combinations of station sites and alignments yield a set of 147 alignments in the geographical segments below.

S.1.1 Segment 1: Sacramento to Stockton

Five station sites have been considered in Sacramento. These are arrayed along three of the primary alignment groups between Sacramento and Stockton, namely the WP and SP as existing freight corridors and the Central California Traction (CCT) corridor.

The S11 Sacramento Downtown station site is served by two possible alignment groups to the south through the segment, which it shares with the other station sites that do not fully reach downtown.

The western approach to the downtown station is under 3rd Street to a point south of US 50 Freeway, then via SP River line and WP mainline to a point north of Stockton. This route is shared in part by station sites at S12 Curtis Park, S13 Sacramento Executive Airport and S15 Freeport West.

The eastern approach to downtown station is via alignment adjacent to SP Fresno line toward the east and south. After Power Inn Road station site, possible alignments south to Stockton follow the SP main line, with a bypass track around Lodi, or follow the Central California Traction right-of-way.

All high-speed alignments converge on a single high-speed alignment near northeastern Stockton. Other lower-speed alignments are able to reach station sites in Stockton.

The three primary alignment groups available from Sacramento to Stockton (WP, SP and CCT) produce 24 variations when considered as station-to-station routes between the two cities.

S.1.2 Segment 2: Stockton to Modesto

Three station sites have been considered in Stockton. Each is served by a lower-speed station track alignment that diverges from the high-speed alignment north and west of the city. It may also be possible to serve one of them on a constrained high-speed alignment.

S21 Farmington Road east of the SR 99 Freeway is the site of a possible joint-use station with Amtrak and may be served on a high-speed alignment. S22 is a downtown site at the existing ACE Commuter Rail station. S23 is a new site at the Stockton Metropolitan Airport.

Alignments south of Stockton follow the BNSF mainline toward eastern Modesto or a new West of 99 alignment toward western Modesto. The BNSF route is adjacent to the existing freight and Amtrak route.

The West of 99 (W99) alignment crosses the SR 99 Freeway and establishes a new route several miles west of the freeway.

The two primary alignment groups available from Stockton to Modesto (BNSF and W99) produce 11 variations when considered as station-to-station routes between the two cities.

S.1.3 Segment 3: Modesto to Merced

Five station sites have been considered in Modesto. Three are reached from the north from BNSF alignments. S31 Modesto Amtrak Briggsmore, S32 Modesto Empire remain on the BNSF route, while S35 Modesto East can be served on a new East of 99 (E99) high-speed alignment. High-speed alignments along the BNSF or E99 route continue toward Merced from these stations.

Two stations reach the western side of the area. S33 Modesto SP Downtown is on a stopping track alignment along the existing SP route, while S34 Modesto West is on a new high-speed W99 alignment farther from the metropolitan area. High-speed alignments along the SP or W99 route continue toward Merced from these stations.

The four primary alignment groups available from Modesto to Merced (W99, SP, BNSF and E99) produce 27 variations when considered as station-to-station routes between the two cities.

S.1.4 Segment 4: Merced to Fresno

Five stations sites have been considered in Merced. Three are reached from the north from either BNSF or E99 alignments. S41 Merced Castle can be connected to all feasible alignments toward Fresno. S42 Merced University lies on a new part of the E99 alignment. This and S45 Merced Plainsboro connect to the combined BNSF/E99 alignment toward the Fresno area.

Two alignments reach the western side of the area from the north. S43 Merced Airport and S44 Merced SP Downtown are reached from the north by either SP or W99 alignments and continue toward Fresno by the same choices. Merced Downtown would not be served by a high-speed alignment.

The three primary alignment groups available from Merced to Fresno (W99, SP and BNSF) produce 25 variations when considered as station-to-station routes between the two cities.

S.1.5 Segment 5: Fresno to Tulare

Six station sites have been considered in Fresno. Three are each reached from the north from the SP, BNSF or W99 high-speed alignments. S51 Fresno Downtown, S52 Fresno Chandler Field and S56 Fresno West can be connected toward Tulare County by one of the same SP, BNSF or W99 routes. S53 Fresno BNSF Amtrak and S54 Fresno Airport were found to have no acceptable alignment connections. The S55 Fresno East station is connected through the area exclusively via the E99 alignment.

The four primary alignment groups available from Fresno to Tulare produce 15 variations when considered as station-to-station routes between the two cities.

S.1.6 Segment 6: Tulare to Bakersfield

Five station sites have been considered in Tulare and Kings County. Each is served exclusively by one of the four major high-speed alignments, although other cross connections could be considered. S61 Visalia

Airport and S63 Tulare Airport lie on the SP alignment. S62 Hanford is on the BNSF route. S64 has an E99 alignment and S65 a W99 alignment.

The four primary alignment groups available from Tulare to Bakersfield (BNSF, W99, SP and E99) produce 29 variations when considered as station-to-station routes between the two cities.

S.1.7 Segment 7: Bakersfield to Los Angeles Connections

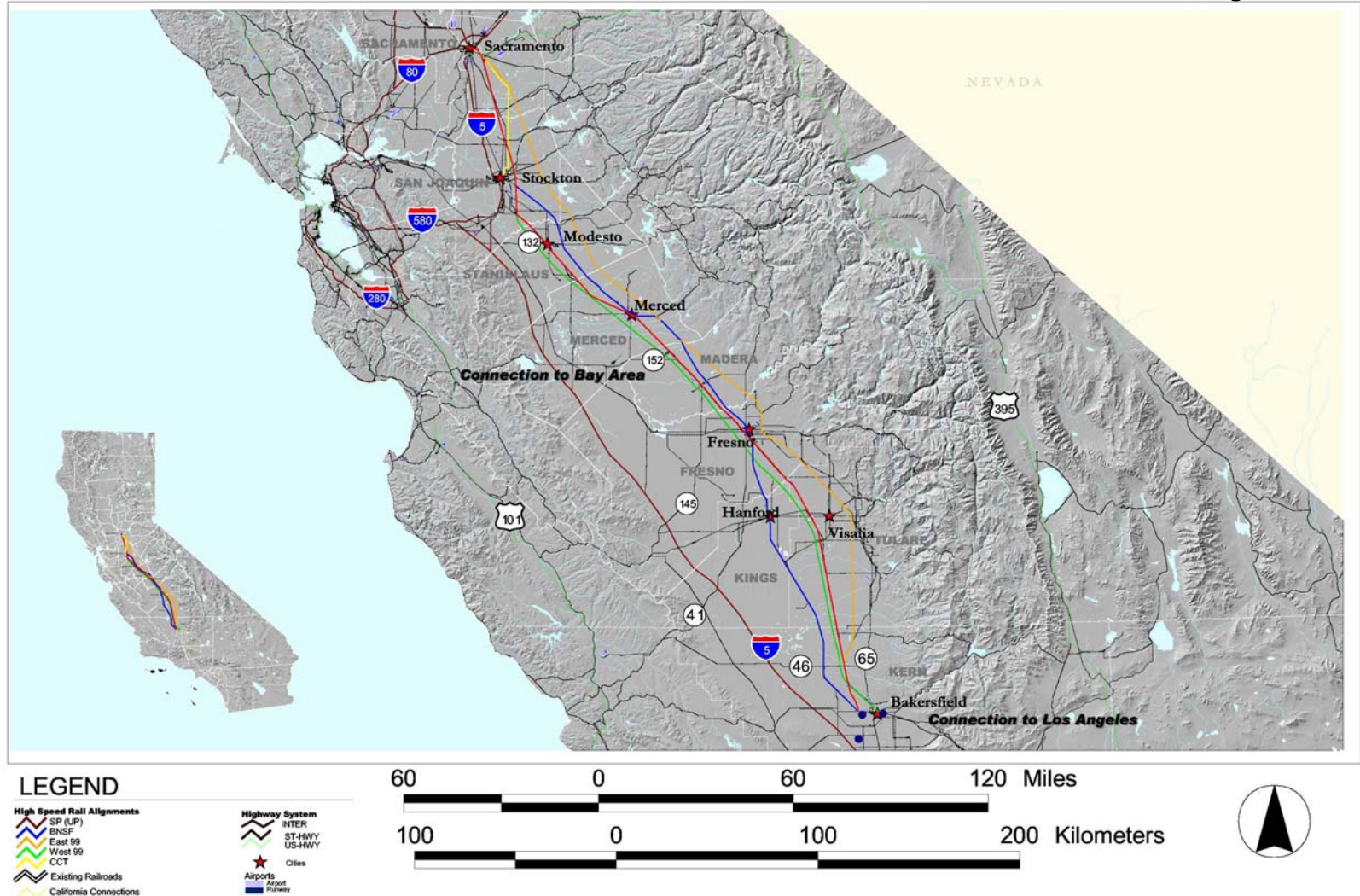
Seven station sites have been considered in the Bakersfield area. All can be reached from the north via each of the SP, W99 and E99 high-speed alignments. They are S71 Bakersfield Truxton, S72 Bakersfield Golden State, S73 Bakersfield Airport, S74 Bakersfield West, S75 Bakersfield East and S77 Bakersfield South. S71 Truxton and S76 Old Amtrak can be reached from the BNSF only by a lower-speed station stopping track alignment.

South of Bakersfield, no rail connections exist except the Union Pacific (SP) freight line toward Mojave and the Techachapi Loop. Stations S74 Bakersfield West and S77 Bakersfield South cannot reach the Mojave route. All stations except S75 Bakersfield East can be linked to the connection points at the I-5 Grapevine or near Comanche Point.

The three connection points to the Bakersfield to Los Angeles produce 16 variations when considered as station-to-connection point routes.

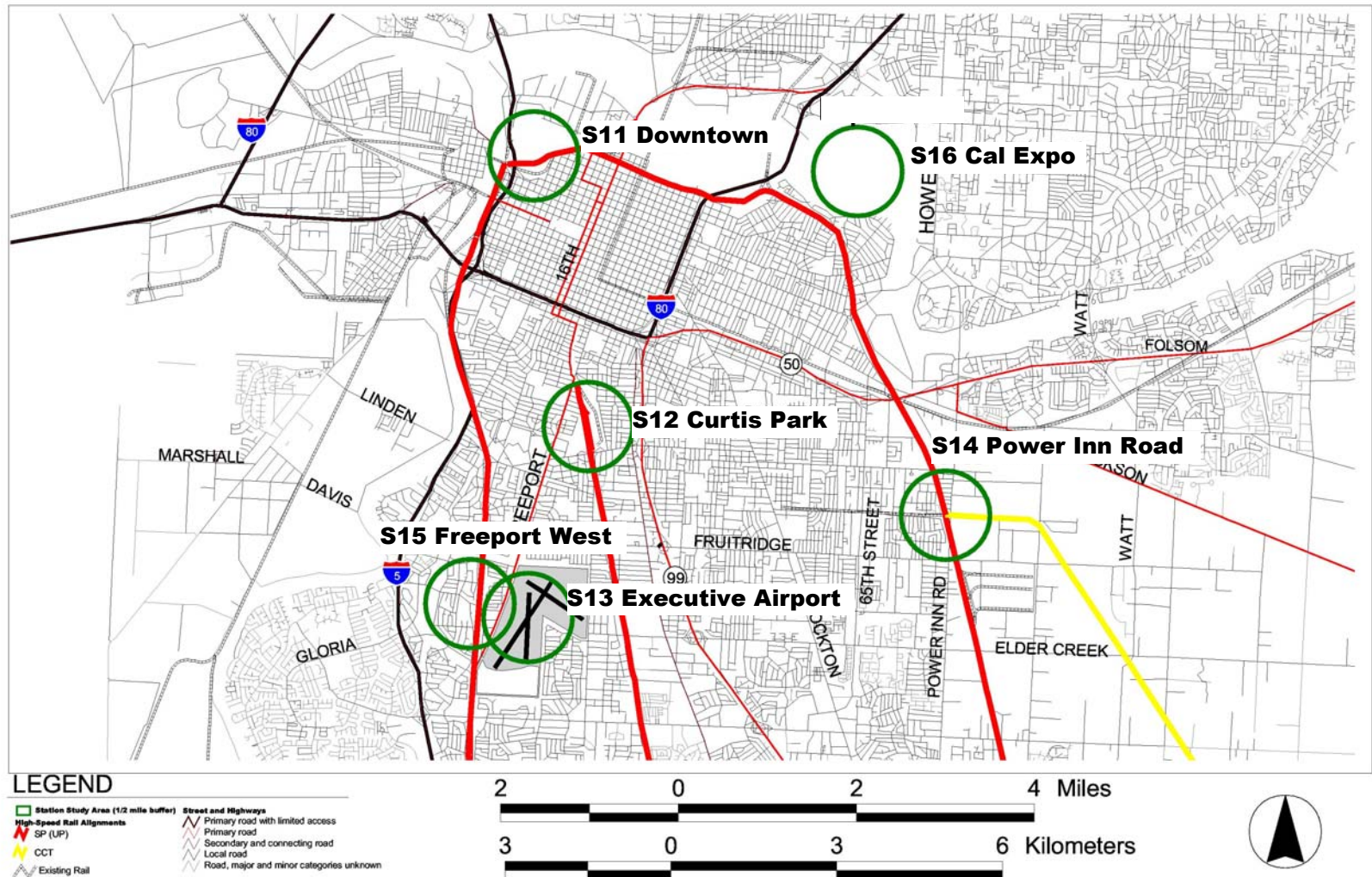
Sacramento-Bakersfield Corridor High-Speed Rail Alternatives

Figure S.1.0



Sacramento Station and Alignment Evaluation

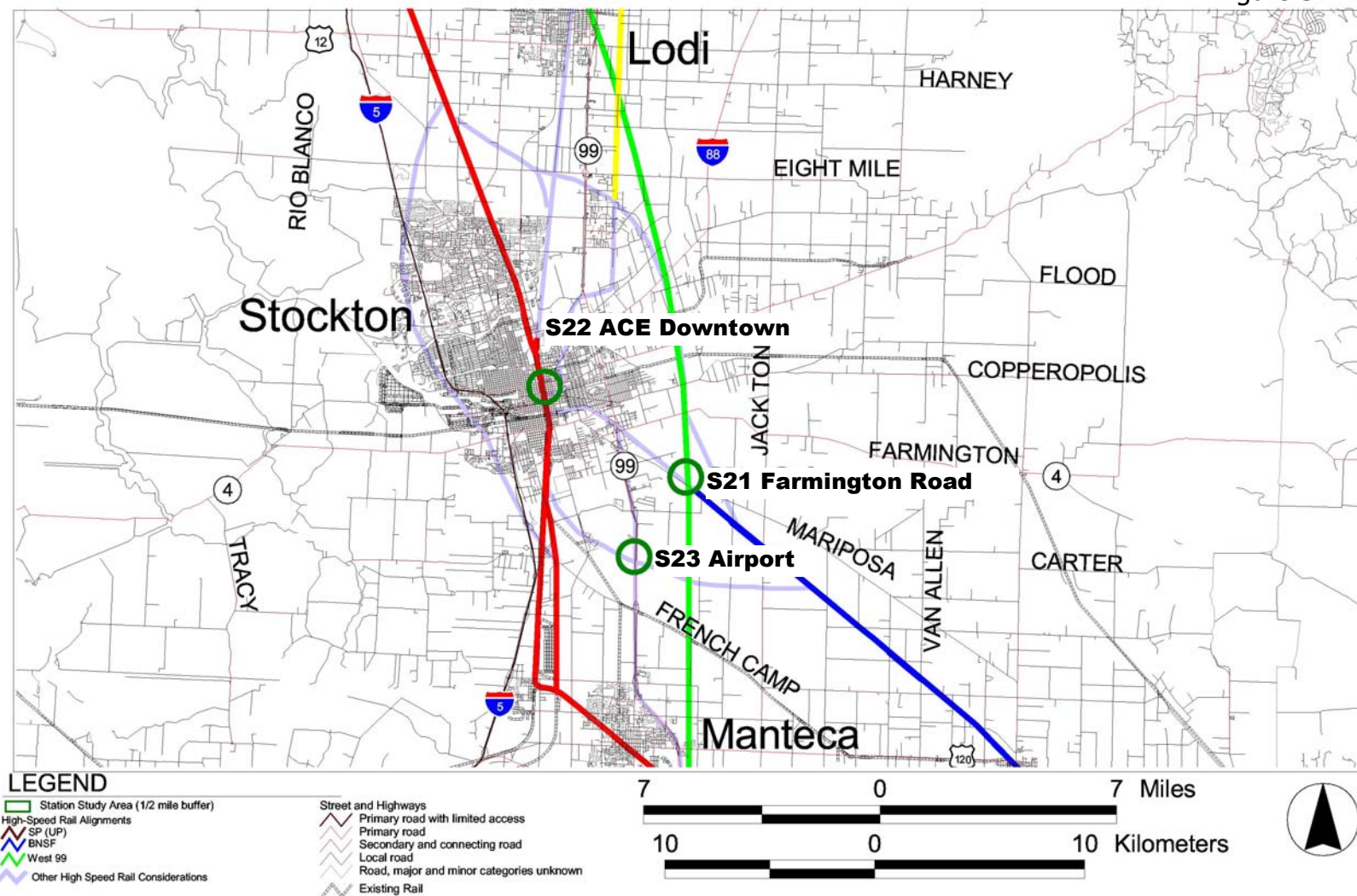
Figure S.1.1





Stockton Station and Alignment Evaluation

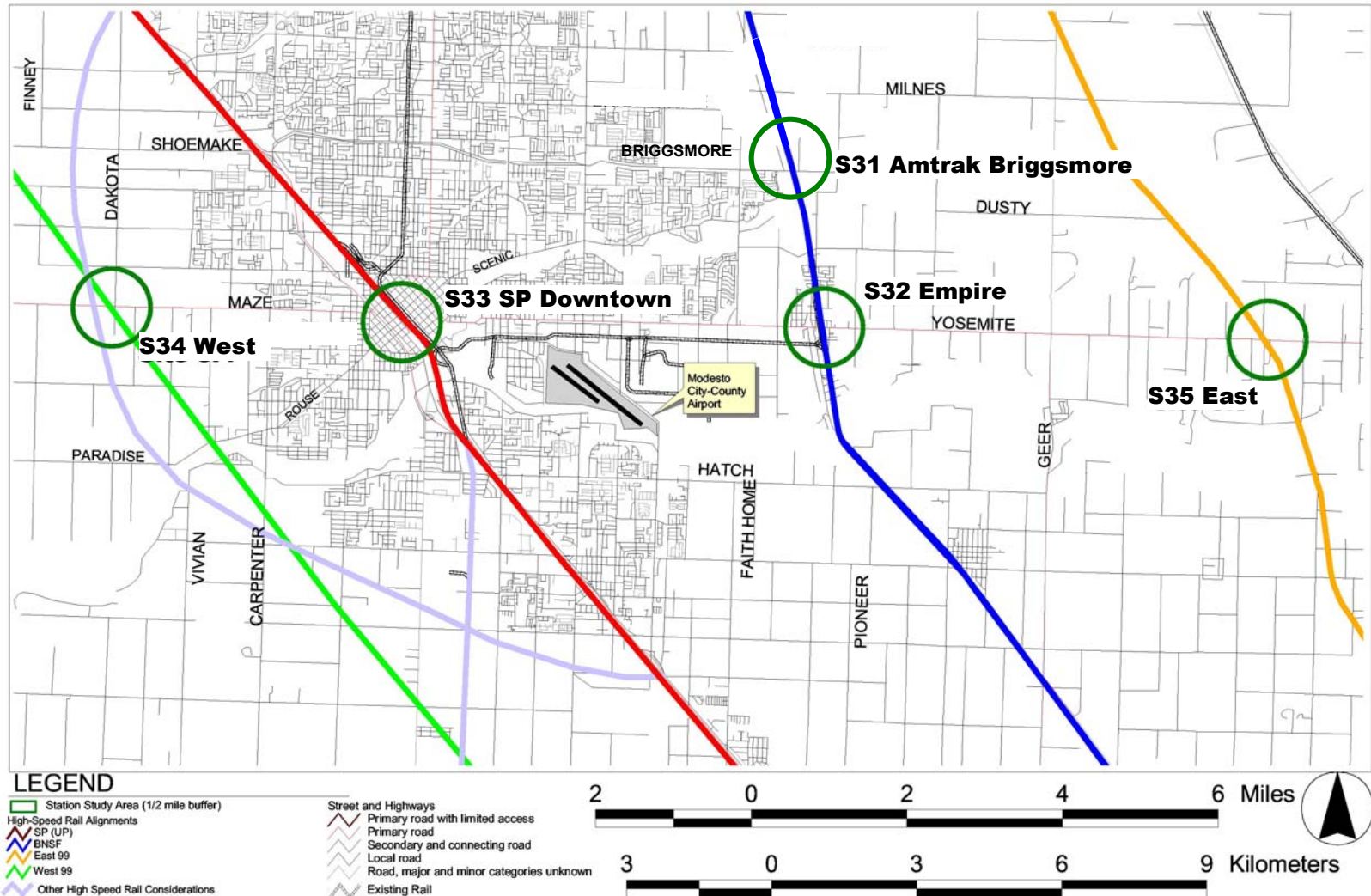
Figure S.1.2





Modesto Station and Alignment Evaluation

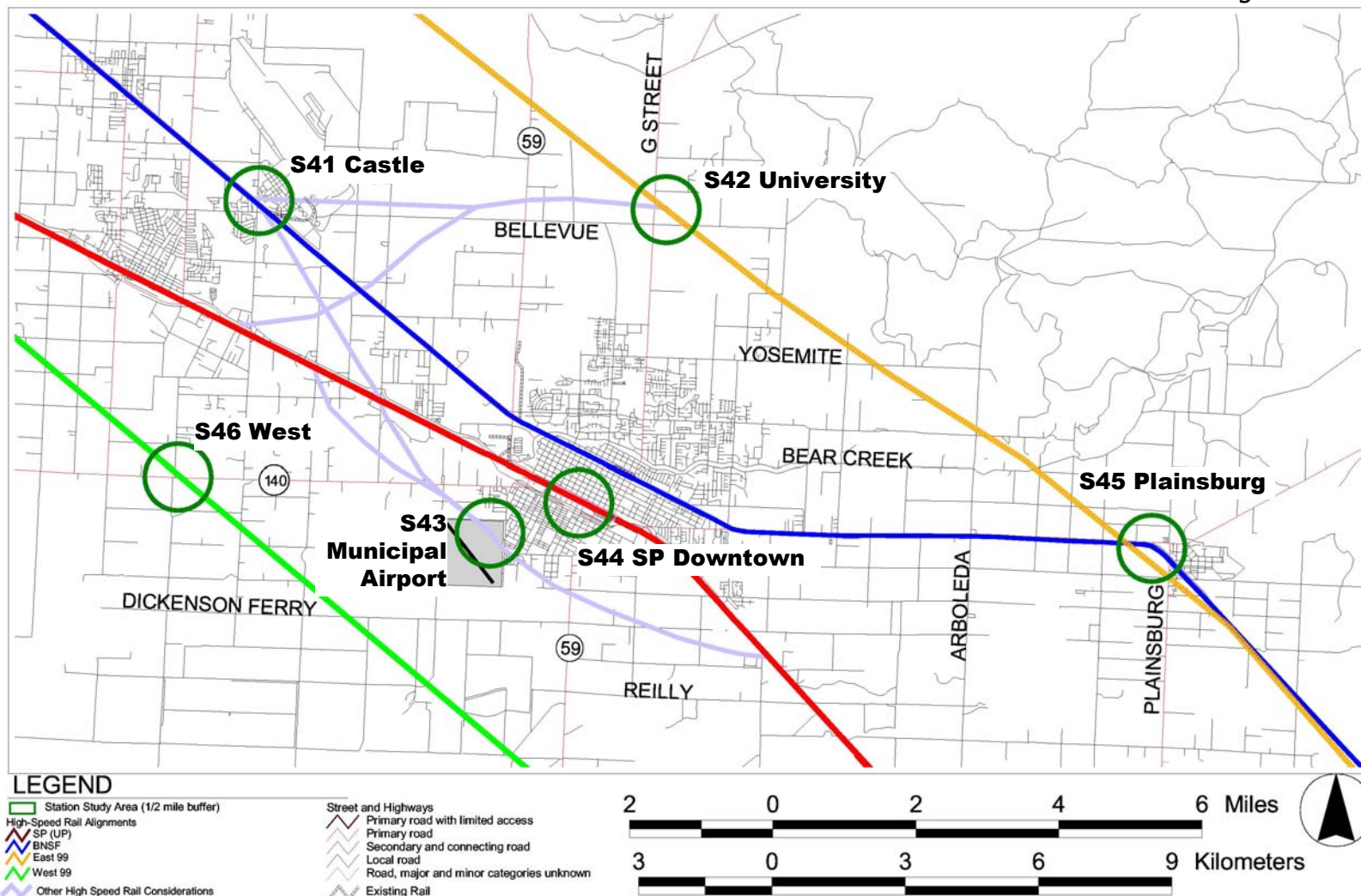
Figure S.1.3





Merced Station and Alignment Evaluation

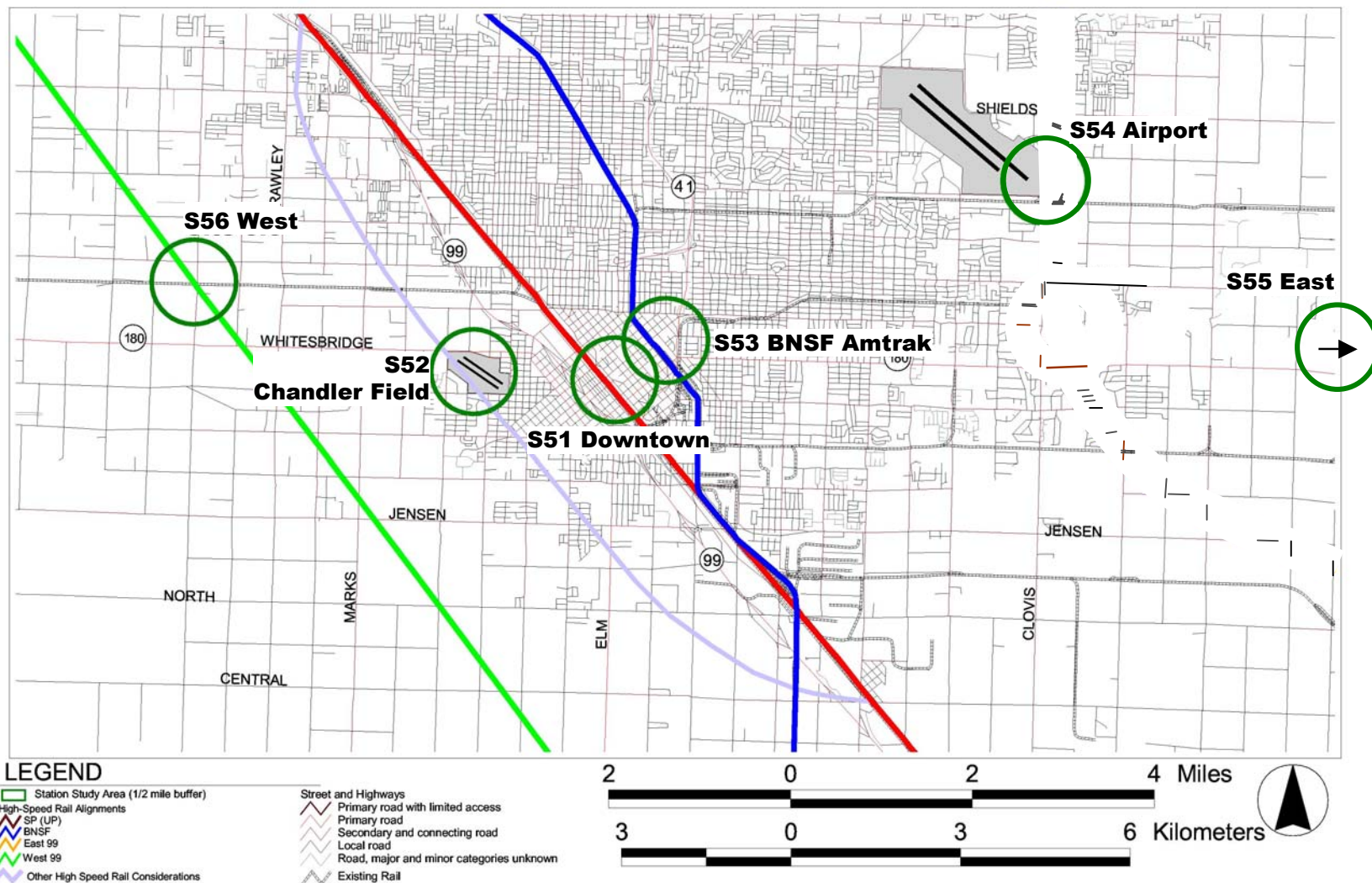
Figure S.1.4





Fresno Station and Alignment Evaluation

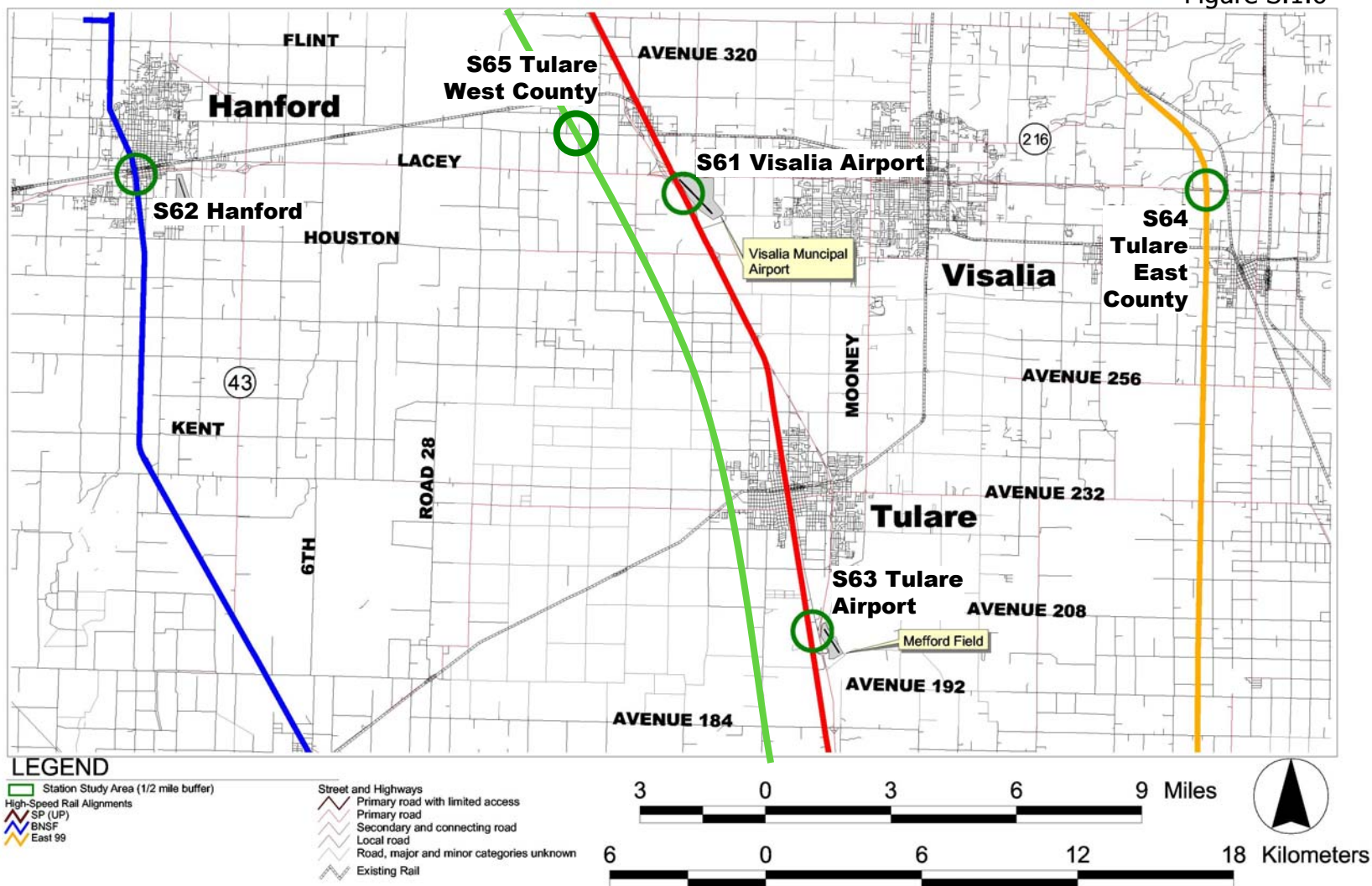
Figure S.1.5





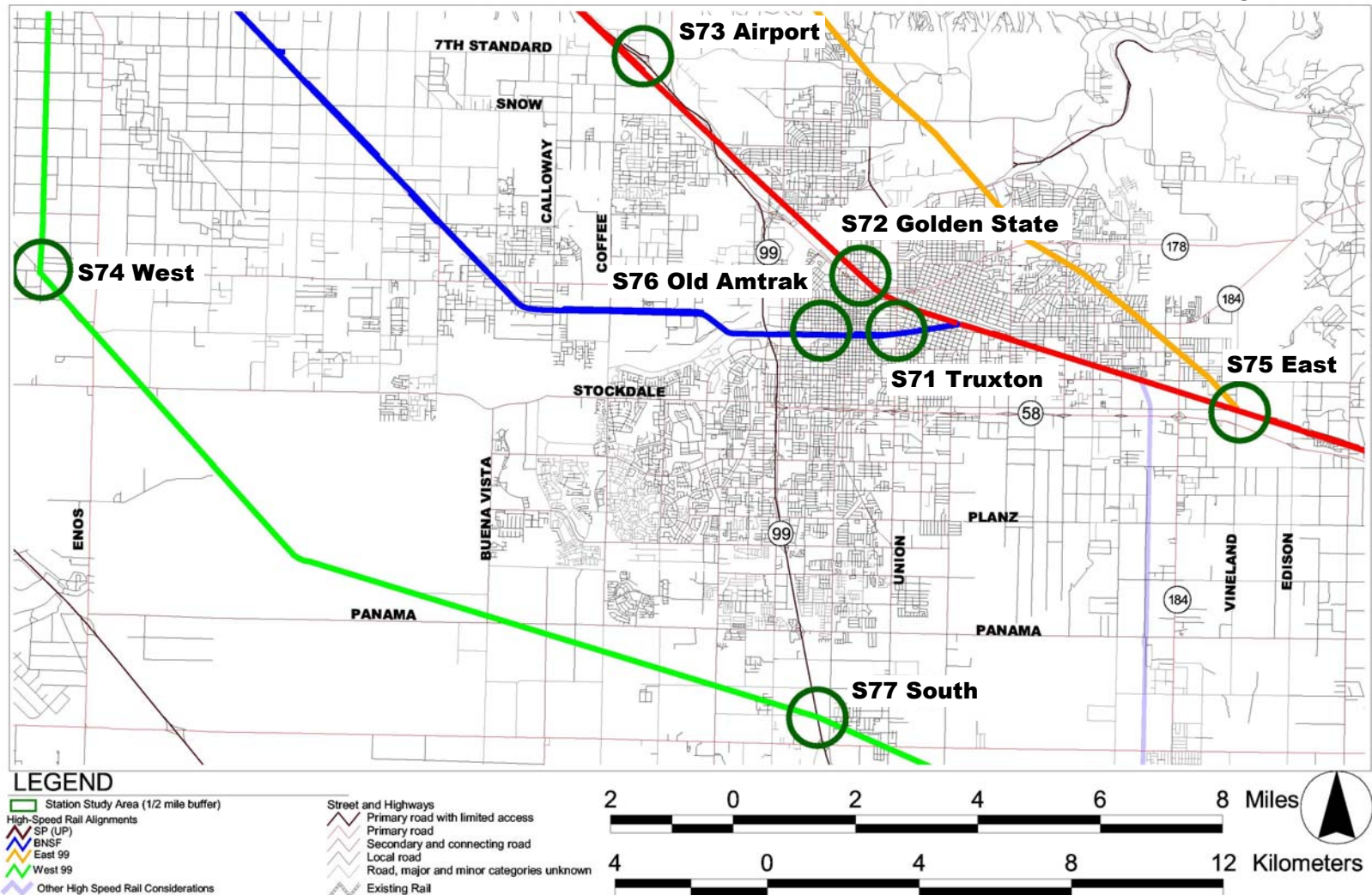
Tulare/Visalia/Hanford Station and Alignment Evaluation

Figure S.1.6



Bakersfield Station and Alignment Evaluation

Figure S.1.7



S.2 ALIGNMENT AND STATION OPTIONS EVALUATION

Alignments through the Sacramento to Bakersfield corridor cover roughly 270 miles (435 km) through an area characterized by agricultural land uses and growing metropolitan areas. The high-speed train system through the region would provide connectivity between Northern and Southern California. The high-speed train system would also connect the Central Valley cities themselves to Northern and Southern California destinations.

The regional screening evaluation analyzes 36 possible station sites and 147 possible alignment options to connect them throughout the seven segments of this corridor. Over the course of the screening evaluation process, it became apparent that there were two major considerations within the Sacramento to Bakersfield section of the High Speed Train Program. First, this section of the statewide system serves as the connector between Northern California (Sacramento and the Bay Area) and Southern California (Los Angeles and beyond). As such, it needs the most direct route and fastest alignment feasible for through trains. Second, the route through the Central Valley provides connectivity for the communities along the line. As such, station sites in the Central Valley cities are a key element in the decision process. As part of the formal environmental process, extensive outreach and involvement activities have occurred throughout this corridor, including: Town Hall and Scoping meetings; meetings with and presentations to elected officials; and interviews with key stakeholders. This outreach and public/agency involvement identified a higher interest in the consequences, benefits, and impacts of the choice of station locations rather than alignments. Station location selection has to be balanced with the need to develop a high-speed train route throughout the Central Valley that also attains the overall objectives established by the Authority.

Use of downtown station sites is strongly preferred locally. These stations exhibit strong connectivity to other modes and are close to central destinations in the cities. They are also sometimes difficult to serve on high-speed alignments. Therefore, the concept of a separate two-track express through route away from the metropolitan center for trains not stopping at a station has been carried through the regional analysis, wherever applicable. Since the length of track required to accelerate from a station stop or to slow for a station stop may be more than three miles on either side of the station, the length of four-track main line sections required in station areas can exceed six miles. The incremental cost for these two separated two-track alignments, a so-called "Italian solution," may not be prohibitive. Its operational benefits and its ability to reduce impacts in cities (that is, only two tracks at the urban station stop) may also commend its use in cities where its use is not absolutely essential to fit a station. In this way, the more desirable station options and the more desirable alignments can be made compatible within the statewide system. However, this solution of stations off the main line will be more costly than using outlying stations within the main line alignment.

The following discussion summarizes the key issues identified in the evaluation of the alignment corridors and station options in each segment. Tables S.2.1A through S.2.7B summarize the level to which each station and alignment option attains the objectives established by the Authority.

S.2.1 Segment 1: Sacramento to Stockton

A. STATIONS

For Sacramento, the choice of a terminal station is between a downtown site (S11) or one of four suburban sites.

S11 Sacramento Downtown. A downtown site connects to other modes most effectively and is closest to government and business destinations. The site also connects best to any northern extension of the system in the future. The central location and the numerous transit connections

also make the site the most costly. Using a southwestern approach to the station would call for underground tracks and platforms, which introduces the complication of the site's proximity to the Sacramento River. Using an eastern approach allows the tracks and platforms to be elevated above the existing station tracks. Both approaches will incur substantial capital costs and will require extensive design coordination with other station area users.

S12 Sacramento Curtis Park. This close-to-downtown site is located on the WP alignment, the most direct existing rail route to the city. Access to the site on the city street grid is constrained, however, and the surrounding land uses are less compatible with a large terminal station than other options.

S13 Sacramento Executive Airport. This near-suburban site has the advantage of sharing use with the city's general aviation airport, a large plot of land already in transportation uses. It connects with the SP River line and the WP route for a direct connection to Stockton. Access is easier and land uses are more compatible than at the nearby S15 Freeport West site. The latter is surrounded by residential properties but is actually astride an existing rail alignment.

S14 Power Inn Road. This suburban site, the most distant from downtown is located in an industrial area southeast of the city center. The station option can be served either by the SP or CCT and is on the eastern rail approach to the downtown area.

A site at the Cal Expo fairgrounds was put forward during the public comment phase of the program. Significant environmental factors and the lack of clear access to the site by either rail or road led to its removal from further consideration.

Environmentally, all of the station sites in Sacramento lie to varying degrees within the 100-year floodplain. None, however, contain wetlands, sensitive biological habitats, farmlands, or stream or scenic corridor crossings. The differences among stations stem primarily from land use, visual, environmental justice, and historic/parkland characteristics. Station areas with fewer potential land use conflicts and visual impacts (i.e., larger percentages of industrial and transportation-related land uses) have the tradeoff of containing larger numbers of environmental justice communities. These are Downtown, Executive Airport, and Freeport West. The Downtown Station site contains a significant number of nationally registered historic properties (7), whereas, the Curtis Park site has a considerable acreage in parklands (about 20).

B. ALIGNMENTS

Two alignments reach downtown from the other station sites, but introduce engineering and environmental factors that increase complexity and cost. The SP River Line to the **WP** alignment defines a western route to downtown. It comes the closest to parklands and traverses environmentally sensitive areas south of the city. However, it is a direct route to downtown with no substandard curves that would slow approaching trains. The eastern approach, the SP Fresno line, the main **SP** route, has the most interactions with existing freight railroad operations north and south of the city and would require slow running for the last six miles to the downtown station site. It also would have impacts on residential neighborhoods east of downtown.

Once out of downtown, three alignment groupings, the Western Pacific (**WP**), the Southern Pacific (**SP**) and the Central California Traction (**CCT**) reach south toward Stockton. Of these, the WP is the most direct route to Stockton. The SP line is surrounded by more development and infrastructure, increasing impacts and remains an important freight route in the region. The study route proposes a bypass loop to the east of the City of Lodi that partially joins the CCT route to avoid the cost and disruption of a high-speed line through the center of that city. The CCT alignment is longer, narrow and hard to connect to existing alignment segments to the

south, but would pose fewer difficulties connecting to a new high-speed alignment. The Lodi bypass route from the SP would also join the CCT route east of Lodi. The CCT route holds interest because of the low population along its route and the possibility that its freight rail owners may seek to abandon the line.

S.2.2 Segment 2: Stockton to Modesto

A. STATIONS

Station options in Stockton include a downtown and two suburban sites, at Farmington Road and at the Stockton Airport.

S21 Farmington Road. This option corresponds to a plan by Amtrak to combine San Joaquin rail service at a single Stockton station along the BNSF line. The site is close to the SR 99 Freeway, but is away from recent growth areas in the Stockton area.

S22 ACE Downtown. This option would concentrate rail service in the downtown area, close to the Altamont Commuter Express commuter rail station. The site is small and the approaches on the WP or SP are narrow and pose engineering challenges. Some land assembly could be undertaken by the City of Stockton.

S23 Stockton Airport. This option would combine compatible transportation uses on a large plot of land. However, the site is well away from downtown and from the growing areas of Stockton. The site would incur almost all of the alignment difficulties of the downtown station option, since access to the site from Sacramento would use the same lower-speed two-track alignment through downtown. While the airport site would have more room for a station, this would not outweigh the other advantages of the downtown site, given the similar alignment challenges.

Environmentally, the Farmington Road and Airport station options have potential impacts on farmlands, stream crossings, and the 100-year floodplain. On the other hand, they have fewer impacts on current land uses than a downtown site. The ACE Downtown Station has the fewest environmental constraints but has the highest percentage of potential conflicts with existing land uses, the greatest number of minority populations and is the only station site in this city with national register historic properties and parklands in its proximity. However, these factors would be expected to occur in a downtown setting.

B. ALIGNMENTS

A single high-speed new alignment allows high-speed running near the city. The Farmington Road alignment/station site is the only investigated option that allows the possibility of high-speed running near the city, although the approach to the site may be easier and cheaper if an express through route with a set of station stopping tracks is also used here. The downtown and airport stations must be accessed by lower-speed alignments, which will still be challenging to construct. The chief obstacle to the downtown alignment is the need to grade separate the line from both the crossing of the BNSF and UP main lines south of the site and from the downtown street grid. An aerial alignment would encounter the SR 4 freeway structure in the area, whereas a trench alignment would need to contend with the high water table in this inland port city. Alignments to the south of Stockton are a new W99 route to the south and the BNSF mainline to the southeast, of which the BNSF is the more direct route toward Modesto and beyond. A new W99 high-speed alignment from the northeastern high-speed route would not serve any of the three investigated station sites. Access to the W99 high-speed route from the S22 ACE

Downtown station would depart from the WP/SP lower-speed alignment near the Lathrop ACE station.

S.2.3 Segment 3: Modesto to Merced

A. STATIONS

Three station types are possible in Modesto. The S33 SP Downtown station includes the city's transit hub, but is a small site that would be accessible only by a slower-speed urban alignment. High-speed trains would need to be on a separate through alignment around the downtown core, which could be provided along the W99 alignment. The SP rail route through the city is very constrained, with development and freight rail uses close to the tracks throughout Modesto. The local street network crosses the tracks at several places. Grade separations in the city would be expensive and visually disruptive in an aerial configuration.

Suburban sites include the new S31 Amtrak Briggsmore option, the site of a new Amtrak station and the S32 Empire option, which is the historical Modesto station site in earlier times.. The Amtrak Briggsmore and Empire sites lies on the more direct BNSF route from Stockton. Of the two, the former shows more promise for Amtrak interaction and would minimize the local traffic improvements that would be necessary at Empire. Freight rail interactions at Empire would also be extensive. Both sites could benefit from an express through track route, even though this would not be essential for construction. Again, an express through route would be essential for the SP downtown station in the city.

New outlying stations are also possible at S34 Modesto West on the new W99 alignment or at S35 Modesto East on the new E99 alignment. Each is farther from the metropolitan area than the other sites, increasing travel times to the stations from the population and employment centers where riders would travel.

Environmentally, the outlying stations, Modesto West and East, are noteworthy in that they encounter few existing environmental constraints, except that they are both entirely devoted to agricultural production. Only the Downtown location contains environmental justice communities, historic properties (1), and parklands (.7 acre). The two suburban sites are markedly different in their characteristics: whereas the Amtrak Briggsmore site has relatively few conflicting land uses and contains a small amount of wetlands and lies within the 100-year floodplain, the Empire site is one-half residential, a generally conflicting land use, but otherwise has few environmental constraints.

B. ALIGNMENTS

Alignments on the east side of the SR 99 Freeway (BNSF and E99) are shorter than those on the west side (SP and W99) in the segments north of Merced. Thus faster travel times are possible on the former. There are no convenient connecting points among the general alignments between Stockton and Merced, so the choice of the most direct route in this segment would require an east side Modesto station. The SP alignment in this segment would impact more and larger communities, increasing costs for construction. The W99 avoids this impact, but runs in otherwise agricultural lands and is the longest of the four routes. On the east side of the Valley, the BNSF touches fewer communities than the SP and runs primarily through agricultural areas. The E99 alignment, the most direct, would be new and farther from the metropolitan area, running also in agricultural areas.

S.2.4 Segment 4: Merced to Fresno

A. STATIONS

One downtown and four suburban stations make up the options for Merced.

The four suburban sites are located on high-speed alignments and offer differing characteristics. S41 Castle uses decommissioned military land. The site is close to the BNSF main line and thus easily accessible by a short loop alignment into the large airbase. The exact location for a high-speed rail station and associated alignment would be part of the base reuse process. The site can be very compatible for a station with little disruption of local access patterns. The site can be connected to all alignments to the south, although is limited to the north to east side alignments (BNSF and E99). Easy access from the developing university campus and community would occur via a new highway along Bellevue Avenue.

S42 Merced University would be on new alignment near the UC Merced campus and community. This station and associated alignment can also be planned integrally with the new university and city planning process, which will direct development to the north of Merced. However, a standard configuration station at this site would entail four high-speed tracks running through the proposed development areas. The use of a University station site would keep the high-speed alignment on the east side of the Valley until closer to Fresno in Madera County.

S43 Merced Airport would share land with aviation uses at the existing municipal airport. The station is close to the SR 99 Freeway but is away from the new university and the areas slated for growth in the area. The site lies on the shortest crossover from the east side alignments to the west side ones.

The S44 SP Downtown option would be the only one to require a slower-speed approach track and an outlying express through route for high-speed trains, due to a constrained rail route through the downtown area. Existing rail uses and multiple crossings of the local street grid require either trenching or aerial structures through the most densely built parts of central Merced, raising construction costs and causing visual impacts. Of the Merced station options, this would be the most costly and least compatible with existing land uses.

S45 Merced Plainsburg lies on the existing BNSF rail line in the settlement of Planada. The E99 alignment would also rejoin the BNSF corridor at this site. The site is the most distant from the established and developing areas of Merced and well into areas that are expected to remain in agricultural land uses.

Environmentally, only one of the Merced Stations, the SP Downtown Station, is highly urbanized. The other four stations are still predominantly agricultural and hence do not involve land uses that are inherently incompatible or visually sensitive to a HSR station and do not contain cultural resources. Agricultural uses are prevalent near the outlying sites, however, and their distance from activity centers would create longer local access paths to the stations. The SP Downtown Station affects the greatest number of minority communities, historic resources, parklands, sensitive land uses, and scenic crossings, and the second highest amount of 100-year floodplain. The four stations in more agricultural areas vary across the board in their environmental opportunities and constraints. For example, the Castle site has an extensive amount of sensitive biological habitat; the University site has the greatest amount of wetlands; the Airport site has the greatest acreage in the 100-year floodplain; and the Airport and Plainsburg sites have the greatest minority populations outside the SP Downtown site.

B. ALIGNMENTS

This segment has great alignment flexibility, since all four major routes through the Central Valley region are closest to each other in this segment. Interconnections would be relatively easy. To maintain the most direct through route in the region, the high-speed line would need to cross from the BNSF or E99 route to the W99 or SP routes near Merced. Opportunities to accomplish this may be designed in conjunction with the new highway being planned to serve the UC Merced campus and community. Using a segment of the E99 alignment to serve the Merced University station would require the high-speed alignment to remain on the BNSF route for some distance to the south. Crossover to the SP or W99 would then require a longer connector, but could be designed in conjunction with the Fresno rail consolidation process. To the south of Merced, the BNSF and the E99 alignments merge and diverge as they move farther to the east, which also lengthens the distance toward Fresno on these eastern alignments. Of the shorter western alignments, the W99 would impact fewer areas of population and freight rail activity, but would have greater impacts on agricultural lands. The SP alignment bisects most settlements in the area and runs parallel to the SR 99 Freeway, where most development in the region has occurred.

S.2.5 Segment 5: Fresno to Tulare

A. STATIONS

Fresno's six station sites display great diversity of location and impacts. Three of them (Fresno Downtown, Fresno West and Fresno East) can be located on high-speed alignments.

The S51 Fresno Downtown station must be designed in conjunction with the ongoing rail consolidation process to ensure sufficient running space in the corridor for high-speed train system requirements. It is now assumed that a four-track high-speed station can fit on this site with existing and future freight rail operations. The configuration of a combined freight railroad through the area is undetermined at this time. If less room is available for high-speed purposes, an express loop on the W99 alignment to the west of the city might be desirable; this arrangement would then require two tracks downtown and two to the west. The downtown site is strongest for connectivity and ridership. It is close to freeways and to urban core destinations. Depending on the exact location of the station along the SP right-of-way, a sufficiently large site can be found to accommodate what will be one of the busiest stations in the Central Valley region.

The S52 Fresno Chandler Field site would be a semi-urban site on a new alignment. The site is close to downtown on a large plot of land already in transportation uses (a general aviation airport). Nearby residential uses would increase impacts in the area, however, and these may also bring some environmental justice concerns. The site is currently not served by any rail line, so a new connector must be constructed from the W99 or the SP alignments, which would cause disruption to the land uses along the new line.

The S53 Fresno BNSF Amtrak site is Fresno's existing passenger rail station. Its site, near the Fresno City Hall, is very constrained and the BNSF mainline through Fresno has slow curves and numerous grade crossings. The alignment also runs through residential areas on a narrow single-track right-of-way, whose removal from mainline freight service is the object of the Fresno Rail Consolidation process.

The S54 Fresno Airport option would make use of a portion of the Fresno Yosemite International Airport, a large transportation site in the region. A suitable high-speed alignment to the site could not be found, however. An earlier E99 alignment to connect this site would have run on a

former rail alignment through the center of the City of Clovis and on a new alignment through parts of eastern Fresno. These impacts have been considered too disruptive. A new E99 alignment has since moved farther east of this site to make use of a conceptual joint freeway alignment.

S55 Fresno East would be an outlying station on a new conceptual joint rail and freeway alignments through the eastern portions of the Central Valley. Caltrans is in the early stages of considering a new easterly Central Valley alignment for extending SR 65 north from the Visalia area to a point in Madera County. This new station site would be located east of Fresno on an E99 shared alignment with the freeway. The station area, now in agricultural use, is considerably farther from the developed areas of Fresno and would require the longest access route of any of the Fresno station options.

S56 Fresno West would be an outlying station on a new alignment west of the city. This station would be located on the W99 route where it crosses SR 180. This site would be west of the developed and growing areas of Fresno and would be located in agricultural lands.

Environmentally, the Downtown, Chandler Field and BNSF Amtrak station locations face greater challenges in terms of land use and visual compatibility, environmental justice, and parkland considerations. The rural Fresno West and Fresno East station sites would not encounter these issues, but the tradeoff is the loss of productive and significant farmland resources. Among the urban stations, the most discriminating environmental criteria are cultural resources, flood hazards, and environmental justice (Downtown and BNSF Amtrak have historic properties, substantial amounts of the 100-year floodplain, and greater populations of minority and low-income households in their boundaries; the other stations have none or considerably less).

B. ALIGNMENTS

All four major routes are available from Fresno to the south. The most direct alignment from the downtown station is on the SP route. An optional high-speed through route would use the same alignment as the W99 route, but without the Fresno West station along its extent. This express through track arrangement offers flexibility in the context of Fresno rail consolidation needs.

The BNSF route has constraints in the City of Fresno that make its consideration for high-speed service doubtful. The line is a single track with no excess right-of-way as it curves through the city. The line crosses many local streets and would require extensive grade separations, raising costs and visual impacts. The alignment is slightly shorter in length as it moves to the south of Fresno, but its drift toward the west places it farther from the population centers in the region between Fresno and Bakersfield.

The E99 route, although only roughly defined as a joint freeway corridor, can still be determined to be the longest route south of Fresno, adding travel time and costs. It also bypasses most of the population and employment centers of the Fresno metropolitan area.

S.2.6 Segment 6: Tulare to Bakersfield

A. STATIONS

The four station sites in Tulare County are similar in characteristics. All would be new stations built on mostly open land. The two airport sites are most centrally located to population centers in the area, with Visalia Airport more accessible to these than Tulare. The Visalia Airport site has much neighboring land already in public ownership and has the most compatible land uses in the area. While Hanford is an existing Amtrak station in an established community, its location is

farthest from population centers in the area and would require long access travel to reach the high-speed line.

Environmentally, all five station sites in the Visalia/Hanford/Tulare area contain extensive amounts of agricultural uses, except Hanford. While the Hanford site avoids natural resource, cultural resource, farmland, and environmental justice considerations, the station area land uses would pose land use conflicts and visual compatibility concerns as it passed through the city. The outlying station locations, Tulare East and West, would disturb the greatest amount of agricultural lands and wetlands and have the highest count of threatened and endangered species. The two airport sites, Visalia and Tulare, are fairly comparable in terms of environmental opportunities and constraints. The Visalia Airport site, however, has one stream and wetland crossing and more than twice as much acreage in the 100-year floodplain; whereas, the Tulare site has a threatened and endangered species in its station vicinity.

B. ALIGNMENTS

The BNSF alignment is the shortest route to Bakersfield by a short increment, but the Hanford station lies too far to the west to serve the majority of the population and employment in the segment. The BNSF approach to Bakersfield also involves a relatively sharp curve in an area that is now residentially built up. The alignment cannot be easily upgraded for high-speed running at this point or through downtown Bakersfield. The next most direct routes are the W99 and SP alignments. The SP alignment serves the two airport stations most directly, but also runs closest to the developed areas along the SR 99 Freeway. The E99 alignment is longest and approaches the Sierra foothills too closely, raising the need for more grading than on other alignments. It also misses most of the population and employment areas of the segment. Alignment and station site factors in Fresno and Bakersfield will have a strong influence on Tulare area choices, since each station in this region is bound for the most part to a single alignment.

S.2.7 Segment 7: Bakersfield to Los Angeles Connections

A. STATIONS

Bakersfield has seven station sites in urban and suburban locations. A local task force has recommended three of them (S71 Bakersfield Truxton, S72 Bakersfield Golden State and S73 Bakersfield Airport) for further study. The downtown sites, S71 Bakersfield Truxton at the new Amtrak station and S72 Bakersfield Golden State, a site just north of the Civic Center on Golden State Blvd, are being considered in the context of a comprehensive update of transportation plans. Recently adopted local traffic alternatives connect both the S71 Truxton option the S72 Golden State downtown options to the local freeway network. However, the freeway alignments chosen remove the conceptual Union Avenue high-speed rail corridor from the Truxton site. Suburban sites at S74 Bakersfield West and S77 Bakersfield South would lie on a new W99 alignment. The S74 Bakersfield West site is located so as to avoid extensive new residential growth areas. It is far from downtown and is farthest from existing and planned freeway access. The S77 Bakersfield South site would be relatively closer to downtown and adjacent to the SR 99 Freeway. The S73 Airport site lies on the Union Pacific (SP) alignment near the SR 99 Freeway and 7th Standard Road, which is also planned for freeway expansion. In addition the recently retired Amtrak station site has been studied as S76 Bakersfield Old Amtrak. A high-speed express through track on a W99 alignment, while not imperative, can reduce construction, operating and environmental impacts for a downtown station in Bakersfield.

Environmentally, only the S76 Old Amtrak and S74 West Station sites contain land uses that would be considered incompatible or visually sensitive to a HSR station. Few of the station sites are environmentally constrained, as most involve no or little water resources, environmental

justice communities, cultural resources, or parklands. The only exceptions are the Truxton Station (environmental justice) and Golden State (water resources). State-designated important farmlands and threatened and endangered species are a consideration for three stations, the Bakersfield Airport, West, and East Stations. The Bakersfield South Station site had the least impacts overall, while the Golden State site had the most.

B. ALIGNMENTS

Connections to the Los Angeles Basin at either the I-5 Grapevine or the Comanche Point connections to the Los Angeles area will require new rights-of-way in agricultural areas without current railroad facilities. Care has been taken to define the new lines as much as possible along existing section roads or along utility easements. This would minimize the introduction of new parcel segmentation. Overall, the impacts of these new lines will be similar to each other in the Central Valley portions of the Bakersfield to Los Angeles region. The choice of one route over another will depend on factors relating to the most desirable crossing of the mountains in the Bakersfield to Los Angeles region.

Table S.2.1A
Sacramento to Bakersfield – High-Speed Train Station Attainment of Objectives
Sacramento Stations

Objective	Station S11 Sacramento Downtown	Station S12 Sacramento Curtis Park	Station S13 Sacramento Executive Airport	Station S14 Sacramento Power Inn Road	Station S15 Sacramento Freeport West		
Maximize Ridership/Revenue Potential							
Maximize Connectivity and Accessibility							
Minimize Operating and Capital Costs							
Maximize Compatibility with Existing and Planned Development							
Minimize Impacts to Natural Resources							
Minimize Impacts to Social and Economic Resources							
Minimize Impacts to Cultural Resources							
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	ND	ND		
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	ND	ND		
























Least Favorable

Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.1B
Sacramento to Bakersfield – High-Speed Train Alignment Attainment of Objectives
Sacramento to Stockton Segment

Objective	WP/SP RIV	SP	CCT/SP	
Maximize Ridership/Revenue Potential				
Maximize Connectivity and Accessibility				
Minimize Operating and Capital Costs				
Maximize Compatibility with Existing and Planned Development				
Minimize Impacts to Natural Resources				
Minimize Impacts to Social and Economic Resources				
Minimize Impacts to Cultural Resources				
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	




























Least Favorable Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.2A
Sacramento to Bakersfield – High-Speed Train Station Attainment of Objectives
Stockton Stations

Objective	Station S21 Stockton Farmington Rd	Station S22 Stockton ACE Downtown	Station S23 Stockton Airport				
Maximize Ridership/Revenue Potential							
Maximize Connectivity and Accessibility							
Minimize Operating and Capital Costs							
Maximize Compatibility with Existing and Planned Development							
Minimize Impacts to Natural Resources							
Minimize Impacts to Social and Economic Resources							
Minimize Impacts to Cultural Resources							
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND				
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND				




















 Least Favorable Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.2B
Sacramento to Bakersfield – High-Speed Train Alignment Attainment of Objectives
Stockton to Modesto Segment

Objective	W99	BNSF		
Maximize Ridership/Revenue Potential				
Maximize Connectivity and Accessibility				
Minimize Operating and Capital Costs				
Maximize Compatibility with Existing and Planned Development				
Minimize Impacts to Natural Resources				
Minimize Impacts to Social and Economic Resources				
Minimize Impacts to Cultural Resources				
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND		
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND		







Least Favorable Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.3A
Sacramento to Bakersfield – High-Speed Train Station Attainment of Objectives
Modesto Stations

Objective	Station S31 Modesto Amtrak Briggsmore	Station S32 Modesto Empire	Station S33 Modesto SP Downtown	Station S34 Modesto West	Station S35 Modesto East		
Maximize Ridership/Revenue Potential							
Maximize Connectivity and Accessibility							
Minimize Operating and Capital Costs							
Maximize Compatibility with Existing and Planned Development							
Minimize Impacts to Natural Resources							
Minimize Impacts to Social and Economic Resources							
Minimize Impacts to Cultural Resources							
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	ND	ND		
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	ND	ND		































Least Favorable

Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.3B
Sacramento to Bakersfield – High-Speed Train Alignment Attainment of Objectives
Modesto to Merced Segment

Objective	W99	BNSF	UP	E99
Maximize Ridership/Revenue Potential				
Maximize Connectivity and Accessibility				
Minimize Operating and Capital Costs				
Maximize Compatibility with Existing and Planned Development				
Minimize Impacts to Natural Resources				
Minimize Impacts to Social and Economic Resources				
Minimize Impacts to Cultural Resources				
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	ND
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	ND







Least Favorable Most Favorable

ND = NOT A DISTINGUISHING FACTOR






















Table S.2.4A
Sacramento to Bakersfield – High-Speed Train Station Attainment of Objectives
Merced Stations

Objective	Station S41 Merced Castle	Station S42 Merced University	Station S43 Merced Municipal Airport	Station S44 Merced SP Downtown	Station S45 Merced Plainsburg		
Maximize Ridership/Revenue Potential							
Maximize Connectivity and Accessibility							
Minimize Operating and Capital Costs							
Maximize Compatibility with Existing and Planned Development							
Minimize Impacts to Natural Resources							
Minimize Impacts to Social and Economic Resources							
Minimize Impacts to Cultural Resources							
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	ND	ND		
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	ND	ND		

Least Favorable Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.4B
Sacramento to Bakersfield – High-Speed Train Alignment Attainment of Objectives
Merced to Fresno Segment

Objective	W99	E99	UP	
Maximize Ridership/Revenue Potential				
Maximize Connectivity and Accessibility				
Minimize Operating and Capital Costs				
Maximize Compatibility with Existing and Planned Development				
Minimize Impacts to Natural Resources				
Minimize Impacts to Social and Economic Resources				
Minimize Impacts to Cultural Resources				
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	

















































Least Favorable Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.5A
Sacramento to Bakersfield – High-Speed Train Station Attainment of Objectives
Fresno Stations

Objective	Station S51 Fresno Downtown	Station S52 Fresno Chandler Field	Station S53 Fresno BNSF Amtrak	Station S54 Fresno Airport	Station S55 Fresno East	Station S56 Fresno West	
Maximize Ridership/Revenue Potential							
Maximize Connectivity and Accessibility							
Minimize Operating and Capital Costs							
Maximize Compatibility with Existing and Planned Development							
Minimize Impacts to Natural Resources							
Minimize Impacts to Social and Economic Resources							
Minimize Impacts to Cultural Resources							
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	ND	ND	ND	
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	ND	ND	ND	


































 Least Favorable Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.5B
Sacramento to Bakersfield – High-Speed Train Alignment Attainment of Objectives
Fresno to Tulare Segment

Objective	W99	BNSF	UP	E99
Maximize Ridership/Revenue Potential				
Maximize Connectivity and Accessibility				
Minimize Operating and Capital Costs				
Maximize Compatibility with Existing and Planned Development				
Minimize Impacts to Natural Resources				
Minimize Impacts to Social and Economic Resources				
Minimize Impacts to Cultural Resources				
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	ND
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	ND






 Least Favorable Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.6A
Sacramento to Bakersfield – High-Speed Train Station Attainment of Objectives
Tulare Stations

Objective	Station S61 Visalia Airport	Station S62 Hanford	Station S63 Tulare Airport	Station S64 Tulare East County	Station S65 Tulare West County		
Maximize Ridership/Revenue Potential							
Maximize Connectivity and Accessibility							
Minimize Operating and Capital Costs							
Maximize Compatibility with Existing and Planned Development							
Minimize Impacts to Natural Resources							
Minimize Impacts to Social and Economic Resources							
Minimize Impacts to Cultural Resources							
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	ND	ND		
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	ND	ND		

Least Favorable Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.6B
Sacramento to Bakersfield – High-Speed Train Alignment Attainment of Objectives
Tulare to Bakersfield Segment

Objective	W99	BNSF	UP	E99
Maximize Ridership/Revenue Potential				
Maximize Connectivity and Accessibility				
Minimize Operating and Capital Costs				
Maximize Compatibility with Existing and Planned Development				
Minimize Impacts to Natural Resources				
Minimize Impacts to Social and Economic Resources				
Minimize Impacts to Cultural Resources				
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	ND
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	ND

Least Favorable
 Most Favorable

ND = NOT A DISTINGUISHING FACTOR

Table S.2.7A
Sacramento to Bakersfield – High-Speed Train Station Attainment of Objectives
Bakersfield Stations

Objective	Station S71 Bakersfield Truxton	Station S72 Bakersfield Golden State	Station S73 Bakersfield Airport	Station S74 Bakersfield West	Station S75 Bakersfield East	Station S76 Bakersfield Old Amtrak	Station S77 Bakersfield South
Maximize Ridership/Revenue Potential							
Maximize Connectivity and Accessibility							
Minimize Operating and Capital Costs							
Maximize Compatibility with Existing and Planned Development							
Minimize Impacts to Natural Resources							
Minimize Impacts to Social and Economic Resources							
Minimize Impacts to Cultural Resources							
Maximize Avoidance of Areas with Geologic and Soils Constraints	ND	ND	ND	ND	ND	ND	ND
Maximize Avoidance of Areas with Potential Hazardous Materials	ND	ND	ND	ND	ND	ND	ND

Least Favorable Most Favorable

ND = NOT A DISTINGUISHING FACTOR

1.0 INTRODUCTION

Since 1992, extensive information has been gathered and preliminary evaluation has been completed concerning the potential environmental effects associated with numerous high-speed train corridor alternatives throughout California. From feasibility studies through conceptual design, a variety of technical studies have been undertaken to address the engineering, operational, financial, ridership, and environmental aspects of such a system. The findings of these studies concluded that California would benefit substantially from high-speed train transportation. Because of the anticipated benefits and the proven need for additional transportation options, the further evaluation of a high-speed train system is seen as the next logical step in the development of California's transportation infrastructure.

The current stage of project development for a statewide high-speed train system is designed to further optimize alignments, avoid/minimize environmental impacts, and develop a more accurate cost figure based on a more refined level of engineering and environmental analysis. As such, the California High-Speed Rail Authority (Authority) has initiated a formal environmental clearance process through the preparation of a state program-level Environmental Impact Report (EIR) and a federal Tier I Environmental Impact Statement (EIS) or Program EIR/EIS. The Program EIR/EIS will satisfy the requirements of the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) for the first tier of environmental review. As part of the Program EIR/EIS, a number of alternatives are being evaluated including a No-Build Alternative, High-Speed Train Alternative(s), and Other Modal Alternatives (aviation, highway, and conventional passenger rail).

To accomplish this program environmental effort, the Authority has divided the state study area into five regions: Bay Area-to-Merced, Sacramento-to-Bakersfield, Bakersfield-to-Los Angeles, Los Angeles-Orange County-San Diego, and Los Angeles-to-San Diego via the Inland Empire.

1.1 PURPOSE

Within the High-Speed Train Alternative, there is a range of high-speed train alignment and station location options to be considered. The majority of these options have been evaluated in prior studies and have been presented to the previous California Intercity High-Speed Rail Commission and the current Authority. Some corridors were carried forward for further consideration while others have been removed from further study based on their relative merit and viability for potential implementation as part of a statewide high-speed train system. Those corridors that have been carried forward are illustrated in Figure 1.1-1 and documented in the Authority's June 2000, *Final Business Plan*² and the December 1999, *California High-Speed Rail Corridor Evaluation*.³

The purpose of the Alignment Screening Evaluation is to consider all reasonable and practical alignment and station options at a consistent level of analysis and focus the program environmental analysis on the most viable of these alignment and station options. The initial set of alignments and station locations was identified by reviewing prior Commission and Authority studies, through meetings with elected officials, and through the environmental scoping process.

² California High-Speed Rail Authority. *Building a High-Speed Train System for California, Final Business Plan*, June 2000.

³ Parsons Brinckerhoff. *California High-Speed Rail Corridor Evaluation*. Prepared for California High-Speed Rail Authority, December 1999.

Figure 1.1-1



Source: California High-Speed Rail Authority. *Building a High-Speed Train System for California, Final Business Plan*, 2000.

The results of this screening process and information differentiating the alignment and station options are documented herein for the Sacramento to Bakersfield region. Similar reports are being prepared for the other four regions. Each of the region screening reports will be summarized into a Statewide High-Speed Train Alignments/Stations Screening Evaluation that will be presented to the Authority Board. Based on recommendations by the Authority staff, the Board will select alignments and stations to be carried forward for more detailed analysis in the Program EIR/EIS.

1.2 BACKGROUND

The California Intercity High-Speed Rail Commission was established in 1993 by Senate Concurrent Resolution (SCR) 6 to investigate the feasibility of a high-speed train system for California, specifically, a system connecting the San Francisco Bay Area, Los Angeles, San Diego, and Sacramento. To address this question of feasibility, the Commission successfully conducted a series of technical studies encompassing ridership and revenue forecasts; economic impact and benefit cost analyses; institutional and financing options; corridor evaluation and environmental impacts and constraints analyses; and preliminary engineering feasibility studies. Based on these studies, the Commission determined that a high-speed train system is technically, environmentally, and economically feasible and set forth recommendations for the technology, corridors, financing, and operation for this system.

The California High-Speed Rail Authority was created by the state Legislature in 1996 (Chapter 796 of the Statutes of 1996 — Senate Bill 1420, Kopp and Costa) to be an implementing agency that would construct, operate, and fund a statewide, intercity high-speed passenger rail system. Based on recently completed studies, evaluations, and previous analysis, the Authority has developed a plan to implement a statewide high-speed train system in California. The current proposal is presented in the Authority's *Business Plan*. The plan describes a 700-mile (1,126-kilometer) -long system capable of speeds in excess of 200 miles per hour (mph) (320 kilometers per hour [km/h]) on dedicated, fully grade-separated tracks with state-of-the-art safety, signaling, and automated train control systems. The system would serve the major metropolitan centers of California.

Beginning in 1992, several studies pertaining to planning, engineering, ridership/revenue, financing, and economic impact have been completed under the direction of the California Department of Transportation (Caltrans), the past Commission, and the current Authority. These studies provided information that formed the basis of the decisions made and direction of the continuing studies. Because of the nature of this initial screening evaluation, this report primarily references the three planning and engineering studies that have been completed. While these studies differed in terms of their specific scopes of work, they all shared the common focus of identifying potential corridors for the implementation of high-speed train lines and evaluating the feasibility and viability of these corridors. Analysis of environmental constraints through use of existing databases and identification of potential impacts were key components of these studies. The studies were completed in consecutive order, allowing for each subsequent study to benefit from, and build on, the work completed in the prior study. Each of the three studies is described in detail in the *California High-Speed Rail Corridor Evaluation - Environmental Summary Report*.⁴ Public involvement was an important part of the feasibility studies. The public was updated on the study progress and key decision points with newsletters and access to the Authority's website.

1.2.1 Los Angeles – Bakersfield Preliminary Engineering Feasibility Study (1994)⁵

Completed in 1994, this study analyzed the feasibility of constructing a high-speed train crossing of the Tehachapi Mountains in Southern California. After considering a broad range of alternative alignments, the study focused on the most viable routes. Two main corridors between Los Angeles and Bakersfield were considered feasible in terms of cost, travel time, and environmental impact: I-5 Grapevine and Palmdale-Mojave. The corridors studied traversed a variety of terrain (urban development, mountains, valley floor, etc.), allowing the engineering and costing analyses to be applicable to other portions of the state. Because of this applicability, work performed for the Los Angeles–Bakersfield study provided an important foundation for the subsequent statewide corridor evaluation studies.

⁴ Parsons Brinckerhoff. *California High-Speed Rail Corridor Evaluation - Environmental Summary*. Prepared for California High-Speed Rail Authority, April 2000.

⁵ Parsons Brinckerhoff. *Los Angeles - Bakersfield High-Speed Ground Transportation Preliminary Engineering Feasibility Study Final Report*. Prepared for Caltrans, December 1994.

1.2.2 California High-Speed Rail Corridor Evaluation and Environmental Constraints Analysis (1996)⁶

This study was conducted in three phases and was completed in 1996. The first phase defined the most promising corridor alignments for linking the San Francisco Bay Area and Los Angeles. During the second phase, these alternative corridors between Los Angeles and the Bay Area were examined in more detail. The third phase examined potential high-speed train system extensions to Sacramento, San Bernardino/Riverside, Orange County, and San Diego. The study identified station locations and estimated travel times; developed construction, operation, and maintenance cost estimates; analyzed environmental constraints and possible mitigation measures; and, in an iterative process with the Ridership Study, developed a conceptual operating plan. The corridors recommended for further study in Phases 2 and 3 were refined in the corridor evaluation studies completed by the Authority.

1.2.3 California High-Speed Rail Corridor Evaluation (2000)⁷

In September of 1998, the Authority commissioned a *Corridor Evaluation* study to assess and evaluate the viability of various corridors throughout the state for implementation as part of a statewide high-speed train system. To address new issues raised by local and regional agencies, further corridor investigations and evaluations were conducted in several areas of the State and compared in the context of updated information on previously studied routes. The Authority was mandated to move forward in a manner that was consistent with, and continued the work of the Commission. Using the Commission's recommended corridors as a foundation, potential corridors were further evaluated on the basis of capital, operating and maintenance costs; travel times; and engineering, operational, and environmental constraints. The corridors were compared and evaluated on a regional basis and as part of a statewide system. From this study, the Authority identified corridors to be included in the current stage of project development as part of the Program EIR/EIS.

⁶ Parsons Brinckerhoff. *California High-Speed Rail Corridor Evaluation and Environmental Constraints Analysis*. Prepared for California Intercity High-Speed Rail Commission, June 1996.

⁷ Parsons Brinckerhoff. *California High-Speed Rail Corridor Evaluation*. Prepared for California High-Speed Rail Authority, December 1999.

2.0 PARAMETERS/ASSUMPTIONS AND EVALUATION METHODOLOGY

Unless otherwise noted, the objectives, parameters, criteria, and methodologies described in this report are consistent with those applied in previous California high-speed train studies and documented in the *California High-Speed Train Program EIR/EIS, Task 1.5.2 – High-Speed Train Alignment/Station Screening Evaluation Methodology*.⁸

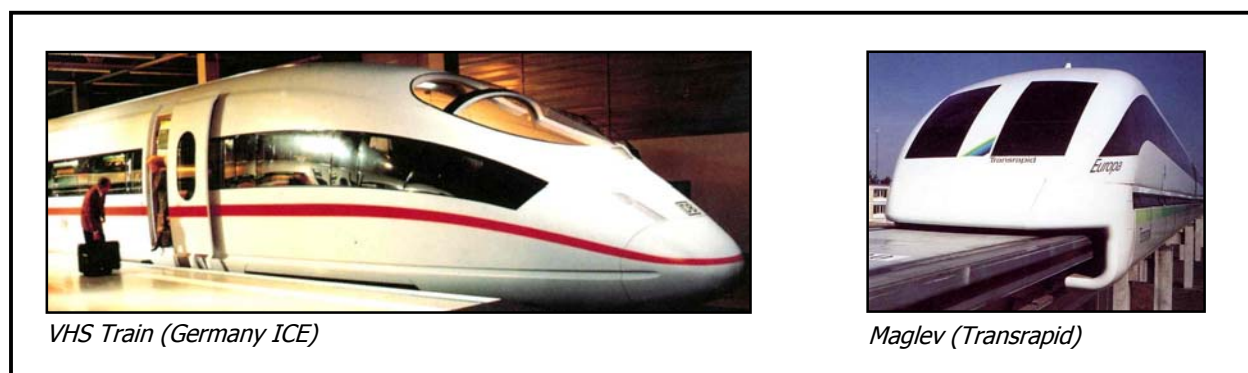
2.1 PARAMETERS/ASSUMPTIONS

High-speed train alignment and station options were developed through consistent application of system, engineering, and operating parameters as described in Task 1.5.2. The parameters and assumptions applied are consistent with those applied in previous planning and engineering studies and are based on accepted engineering practice, the criteria and experiences of other railway and high-speed rail systems, and recommendations of VHS and maglev manufacturers.

2.1.1 Statewide Parameters/Assumptions

The design, cost, and performance parameters used in developing the alignment and station options are based on two technology groups (classified by speed) (Figure 2.1.1). The Very High Speed (VHS) group includes trains capable of maximum operating speeds near 220 mph (350 km/h) utilizing steel-wheel-on-steel-rail technology. Requirements for a VHS system include a dedicated, fully grade-separated right-of-way with overhead catenary for electric propulsion. It is possible to integrate a VHS system into existing conventional rail lines in congested urban areas given resolution of certain equipment and operating compatibility issues. The magnetic levitation (maglev) group utilizes magnetic forces to lift and propel the train along a guideway and is designed for maximum operating speeds above that of VHS technology. A maglev system requires a dedicated guideway and may share right-of-way but not track with conventional train systems.

Figure 2.1.1
VHS and Maglev Technology



⁸ Parsons Brinckerhoff. *California High-Speed Train Program EIR/EIS, Task 1.5.2 – High-Speed Train Alignments/Stations Screening Evaluation Methodology*. Prepared for California High-Speed Rail Authority, May 2001.

High-speed train system engineering design parameters used in developing the alignments were documented in Task 1.5.2 and include speeds, geometry, and clearances for both steel-wheel-on-steel-rail (VHS) and maglev high-speed train technologies. The parameters and criteria, summarized in Table 2.1-1, are consistent with previous California high-speed train studies and are based on accepted engineering practice, the criteria and experiences of other railway and high-speed train systems, and recommendations of VHS and maglev manufacturers.

**Table 2.1-1
Summary of Engineering Design Parameters**

Parameter	Very High-Speed	Maglev
Double Track	Full	Full
Power Source	Electric	Electric
Grade Separations	Full	Full
Potential for Shared Use	Yes	No
Corridor Width		
<input type="checkbox"/> Desirable	100 ft (30.4 m)	100 ft (30.4 m)
<input type="checkbox"/> Minimum	50 ft (15.2 m)	50 ft (15.2 m)
Top Speed	220 mph (350 km/h)	240 mph ⁽¹⁾ (385 km/h)
Average Speed	125-155 mph (200-250 km/h)	145-175 mph (230-280 km/h)
Acceleration	0.4-1.3 mph/s ³ (0.6-2.1 km/h/s ⁴)	1.1-1.9 mph/s (1.8-3.2 km/h/s)
Deceleration	1.2 mph/s (1.9 km/h/s)	1.8 mph/s (2.9 km/h/s)
Minimum Horizontal Radius	500-650 ft (150-200 m)	1,150 ft (350 m) (2)
Minimum Horizontal Radius (at top speed)	15,600 ft @ 220 mph (4,750 m @ 350 km/h)	11,500 ft @ 240 mph (3,500 m @ 385 km/h)
Superelevation		
<input type="checkbox"/> Actual (Ea)	7 in (180 mm)	16°
<input type="checkbox"/> Unbalanced (Eu)	5 in (125 mm)	5°
Grades		
<input type="checkbox"/> Desirable Maximum	3.5%	NA
<input type="checkbox"/> Absolute Maximum	5.0%	10.0%
Minimum Vertical Radius Crest Curve (at top speed)	157,500 ft @ 220 mph (48,000 m @ 350 km/h)	205,700 ft @ 240 mph (62,700 m @ 385 km/h)
Minimum Vertical Radius Sag Curve (at top speed)	105,000 ft @ 220 mph (32,000 m @ 350 km/h)	137,100 ft @ 240 mph (41,800 m @ 385 km/h)
Horizontal Clearance (centerline of track to face of fixed object)	10 ft 4 in @ 220 mph (3.1 m @ 350 km/h)	9 ft 5 in @ 240 mph (2.8 m @ 385 km/h)
Vertical Clearance (top of rail to face of fixed object)	21 ft (6.4 m)	12 ft 2 in (3.7 m)
Track Centerline Spacing	15 ft 8 in @ 220 mph (4.7 m @ 350 km/h)	15 ft 9 in @ 240 mph (4.8 m @ 385 km/h)
Minimum Right-of-Way Requirements		
At-Grade/Cut-and-Fill/Retained Fill	50 ft (15.2 m)	47 ft (14.3 m)
Aerial Structure	50 ft (15.2 m)	49 ft (15 m)
Tunnel (Double Track)	67 ft (20.4 m)	67 ft (20.4 m)
Tunnel (Twin Single Track)	120 ft (36.6 m)	120 ft (36.6 m)
Trench/Box Section	70 ft (21.3 m)	73 ft (22.2 m)
Minimum Station Platform Length	1,300 ft (400 m)	1,300 ft (400 m)
Minimum Station Platform Width	30 ft (9 m)	30 ft (9 m)
Notes: 1- Top Speed Defined in Federal Maglev Deployment Plan 2- Transrapid USA, 1998. 3- mph/s – miles per hour-second 4- km/h/s – kilometers per hour-second		

Based on the minimum requirements listed in Table 2.1-1, three general right-of-way parameters were utilized for the screening evaluation: (1) a minimum right-of-way corridor of 50 feet (15.2 meters) was assumed in congested corridors; (2) a 100-foot (30.4-meter) corridor was assumed in less developed areas to allow for drainage, future expansion and maintenance needs; and (3) a wider corridor was assumed in variable terrain to allow for cut and fill slopes and tunnels.

The overall operations strategy and conceptual service parameters that were assumed for high-speed train service in California are documented in Task 1.5.2. Specific scheduling and operations modeling analysis is currently underway and will be used in future detailed engineering and environmental analyses in the next phase of this study.

2.1.2 Sacramento to Bakersfield Parameter/Assumption Variances

The regional analysis for the Central Valley routes of the High-Speed Train system does not deviate from statewide parameters or assumptions in engineering or environmental categories.

Since the Central Valley regional routes cover about 270 miles of line, its alignments bear a strong responsibility for achieving the desired statewide travel time objectives. Thus it is imperative that the highest possible through train running speeds be maintained throughout the region. To meet this objective, alignments have been identified in each city-to-city sector that allow for full-speed running from one end of the region to the other. Some of these full-speed through alignments will allow for the use of the standard configuration for intermediate stations. Other through line segments, which are called express loops, do not allow for any stations along their length and thus would only be used by non-stopping trains at full speed. Corresponding line segments, however, called stopping track alignments, provide access to station sites off the full-speed routes. These line segments are engineered to the highest speed possible, but take account of the fact that all trains on them will be stopping at the station. Therefore, curvature and other engineering characteristics may be modified to reduce costs and impacts at the station approaches, as long as resulting speed constraints remain within the envelope of decelerating and accelerating train performance.

While the geographic constraints of the Central Valley region seem minimal compared to the mountainous terrain and densely urban conditions in other regions, other environmental and socio-economic constraints characterize the region, as emphasized by residents and regional leaders throughout the study process. Three major categories of impacts have been identified for the region:

- **Agricultural lands.** The Central Valley contains agricultural resources that contribute massively to California's economy and the food supply of the state and the nation. Preservation of prime agricultural lands or the minimizing of impacts of the High-Speed Train system to such lands becomes a significant category in the evaluation process.
- **Sensitive resource environments.** Both new and existing alignments must be evaluated for impacts to sensitive habitats of threatened and endangered species and impacts to non-agricultural natural land uses.
- **Growth.** The Central Valley is forecast to be a major area of growth in population and economic activity in the coming decades. The High-Speed Train system will have strong consequences for the spatial development of station cities along its route. Evaluation of land uses, both existing and new, has been a strong concern of all Central Valley officials and stakeholders in the environmental process. This is particularly evident in the discussion of central city versus outlying station sites.

2.2 EVALUATION METHODOLOGY

As listed in Table 2.2-1, a number of key evaluation objectives and criteria were developed based on previous studies with enhancements that reflect the Authority's high-speed train performance goals and criteria described in Task 1.5.2. These objectives and criteria have been applied in the screening of high-speed train alignment and station options developed as part of this process. Each of the evaluation criteria is discussed in Chapter 4.0, Alignment and Station Evaluation.

**Table 2.2-1
High-Speed Rail Alignment/Station Evaluation Objectives and Criteria**

Objective	Criteria
Maximize Ridership/Revenue Potential	<ul style="list-style-type: none"> Travel Time Length Population/Employment Catchment
Maximize Connectivity and Accessibility	<ul style="list-style-type: none"> Intermodal Connections
Minimize Operating and Capital Costs	<ul style="list-style-type: none"> Length Operational Issues Construction Issues Capital Cost Right-of-Way Issues/Cost
Maximize Compatibility with Existing and Planned Development	<ul style="list-style-type: none"> Land Use Compatibility and Conflicts Visual Quality Impacts
Minimize Impacts to Natural Resources	<ul style="list-style-type: none"> Water Resources Floodplain Impacts Threatened & Endangered Species Impacts
Minimize Impacts to Social and Economic Resources	<ul style="list-style-type: none"> Environmental Justice Impacts (Demographics) Farmland Impacts
Minimize Impacts to Cultural Resources	<ul style="list-style-type: none"> Cultural Resources Impacts Parks & Recreation/Wildlife Refuge Impacts
Maximize Avoidance of Areas with Geologic and Soils Constraints	<ul style="list-style-type: none"> Soils/Slope Constraints Seismic Constraints
Maximize Avoidance of Areas with Potential Hazardous Materials	<ul style="list-style-type: none"> Hazardous Materials/Waste Constraints

The engineering and environmental methodologies and assumptions used in evaluating the high-speed train alignment and station options are described in detail in Task 1.5.2.

2.2.1 ENGINEERING EVALUATION CRITERIA

The engineering evaluation criteria focus on cost and travel time as primary indicators of engineering viability and ridership potential. Items such as capital costs and travel times have been quantified for each of the alignment and station options considered. Other engineering criteria such as operational, construction, and right of way issues are presented qualitatively.

The evaluation criteria presented are consistent with the criteria applied in the previous corridor evaluation study and are based on accepted engineering practice, the criteria and experiences of other railway and high-speed train systems, and recommendations of VHS and maglev manufacturers.

A. SACRAMENTO TO BAKERSFIELD ENGINEERING METHODOLOGY VARIANCES

The relative lack of geographic constraints in the Sacramento to Bakersfield region raises no compelling differences in the performance characteristics of steel-wheel-on-steel-rail vehicles versus magnetic levitation vehicles. Thus no differential alignments have been proposed for

maglev technology. The two technologies will be distinguished in the region only by the categories of travel time and costs.

2.2.2 Environmental Evaluation Criteria

The objectives related to the environment and the criteria used for evaluation are consistent with NEPA and CEQA. The environmental constraints and impacts criteria focus on environmental issues that can affect the location or selection of alignments and stations.

To identify potential impacts for the alignments and station locations, a number of readily available resource agency-approved Geographic Information System (GIS)-compatible digital data sources were used along with published information from federal, state, regional, and local planning documents and reports. For evaluation of alignments and stations, right-of-way widths dictated by engineering requirements were utilized to identify the amount of area within each segment containing certain characteristics. Some environmental issues required using various buffer widths that extended beyond the conceptual right-of-way for the segments. Where noted, field reconnaissance was required to view on-the-ground conditions and to provide relative values of certain resources.

B. SACRAMENTO TO BAKERSFIELD ENVIRONMENTAL METHODOLOGY VARIANCES

This discussion highlights the information used to evaluate the alternative alignments and station locations. For some environmental factors, the amount of information collected and considered is more extensive than recommended in the Task 1.5.2 Screening Methodology Report; in other cases, the information desired for the screening methodology was not available and surrogate data were used instead.

Environmental Factor	Environmental Measures	Variance from Task 1.5.2 Report	Rationale
Land Use – Potential Land Acquisition and Displacement	<ul style="list-style-type: none"> Acres of existing land use within ROW; approximately 30 different land use categories 	Land acquisition and displacement not specifically addressed by screening report, which focused more on land use compatibility; i.e., effects on adjacent land uses.	Land use within ROW will help identify loss of jobs, housing, social institutions and public facilities. Also, desirable to develop ROW cost estimates.
Land Use – Land Use Compatibility	<ul style="list-style-type: none"> Acres of existing land use adjacent to HSR corridor 	Lands within 200 feet of the alignment centerline were considered sufficient to identify potential land use compatibility issues. Land uses were aggregated into approximately 12 different categories to assess compatibility. The percentage of each type of land use was calculated to get a sense of the composition of land uses in the segment or station area.	Most favorable adjacent land uses would be Open Space (disturbed/developed), Commercial and Office; least favorable adjacent land uses would be Residential (ranchettes, single family), Institutional (school, hospital, church, library). Moderately favorable adjacent land uses would be Industrial, Institutional (military, government), Residential (multi-family), Recreation.

Environmental Factor	Environmental Measures	Variance from Task 1.5.2 Report	Rationale
Land Use – Consistency with General Plan and Public Policies	<ul style="list-style-type: none"> Acres of General Plan land use adjacent to HSR corridor 	Lands within 200 feet of the alignment centerline and 1/2-mile station area radii were considered sufficient to identify support or impedance of local land use policies. Land uses were aggregated into approximately 12 different categories to assess compatibility. The percentage of each type of land use was calculated to get a sense of the composition of land uses in the segment or station area. Information regarding local Redevelopment Plan areas was collected to further inform this assessment.	Same as above
Visual Quality	<ul style="list-style-type: none"> Acres of existing land use adjacent to HSR corridor 	Lands 1/2-mile station area radii were considered sufficient to capture the first row of viewers. Visual characteristics along the alignments were not collected.	Visual impacts of alternative alignments between station areas were not considered to be a significant factor in distinguishing among the alignments.
Water Resources - Streams	<ul style="list-style-type: none"> Number of stream crossings within the ROW Natural v. Improved Left Bank v. Right Bank 	Additional data evaluated regarding the type of stream	Crossing/disturbance of natural stream crossings would presumably result in greater environmental impacts.
Water Resources - Floodplains	<ul style="list-style-type: none"> Incidences of crossings within the ROW Length of crossing Acres of encroachment 	Additional data evaluated regarding the incidence and length of floodplain crossings	Desirable to know how many flood hazard areas are affected and length of disturbance for cost and better understanding of amount of floodplain capacity displaced. For example, two different segments affected about 3 acres of floodplain, but one segment had nine floodplain crossings and total length of encroachment of 330m; whereas, the second segment had one floodplain crossing over 408 meters.
Water Resources - Wetlands	<ul style="list-style-type: none"> Incidences of crossings Length of crossing Acres of encroachment within ROW Acres of encroachment within 400 feet 	Screening report calls for identifying acres of wetlands within and adjacent to the HSR corridor. "Adjacent areas" addressed by 400-foot buffer.	
Biological Resources - Threatened and Endangered Species	<ul style="list-style-type: none"> Count of species within ROW Count of species within 400 feet 	Screening report calls for identifying affected species within and adjacent to HSR corridor. "Adjacent areas" addressed by 400-foot buffer.	CNDDDB contains overlapping polygons which does not allow GIS determination of acreage of endangered species habitat within or adjacent to corridor. Sensitive habitat impacts identified using GAP data (see row below).

Environmental Factor	Environmental Measures	Variance from Task 1.5.2 Report	Rationale
Biological Resources - Sensitive Habitat	<ul style="list-style-type: none"> Acres of encroachment within ROW Acres of encroachment within 400 feet Acres by each habitat type reported in the GAP database 	Use of GAP habitat data as a surrogate for threatened and endangered species.	CNDDDB does not lend itself to GIS queries. GAP data, listing some 30 habitat types, were linked to the State system of rating habitats for biological sensitivity. State ranks 1.1, 1.2, 2.1, 2.2, 3.1, and 3.2 indicate the presence of threatened and endangered species.
Environmental Justice	<ul style="list-style-type: none"> Ethnic minority population within Census block groups that have >50% minority Low income households within Census block groups 	All block groups that occurred within 1400-foot buffer were included in analysis; even if only a small portion of the block group was inside the buffer. Low-income populations are defined by Census definition of low-income; not sure how this relates to \$12.6k figure in the screening report.	
Farmlands	<ul style="list-style-type: none"> Acres of Prime, Unique, and Statewide Importance within the ROW 	None	
Cultural Resources	<ul style="list-style-type: none"> Incidences of NRHP properties within ROW Incidences of NHRP properties within 400 feet 	NRHP data file was consulted. Properties "adjacent" to the HSR were also considered.	Other data sources such as CHRIS and local inventories were not consulted because they did not exist electronically. Resources were also identified within 400 feet of alignment to capture indirect effects that might result from change in visual or audible setting or in access.
Parks and Recreation/Wildlife Refuge	<ul style="list-style-type: none"> Incidences of park and recreation properties within ROW and within 400 feet Acres of park and recreation properties within ROW and within 400 feet 	Properties "adjacent" to the HSR were also considered.	Resources were also identified within 400 feet of alignment to capture indirect effects that might result from change in visual or audible setting or in access.
Soils/Slope Constraints	<i>waiting for info from Kleinfelder</i>		
Seismic Constraints	<i>waiting for info from Kleinfelder</i>		
Hazardous Materials/Waste Constraints	<i>waiting for info from Kleinfelder</i>		

3.0 ALIGNMENT AND STATION DEFINITION

The Sacramento to Bakersfield region, the Central Valley, will provide the connection between Northern and Southern California for the California High-Speed Train system by an alignment that follows the general route of State Highway 99. The system will serve the region via the station cities of Sacramento, Stockton, Modesto, Merced, Fresno, the Tulare area and Bakersfield. A connection to the Bay Area will meet this route in the vicinity of Merced, either north or south of the city, depending on the final selection of an optimal route to San Jose and the southern Bay Area. The Central Valley route will also connect to the Los Angeles area and other Southern California communities on an alignment south or east of Bakersfield, again depending on the selection of an optimal alignment through the Tehachapi Mountains.

3.1 PREVIOUS ALIGNMENT AND STATION OPTIONS STUDIED

Several planning and engineering studies have been completed under the direction of the California Intercity High Speed Rail Commission (Commission) and the current California High Speed Rail Authority (Authority). These studies focused on identifying potential corridors for the implementation of high-speed rail service between northern and southern California and evaluating the feasibility and viability of those corridors. The potential routes were grouped into the three general corridors: Coastal Corridor, Interstate 5 (I-5) Corridor, and Central Valley (SR-99) Corridor.

3.2 CONFIRMATION OF REASONS OPTIONS SCREENED FROM FURTHER ANALYSIS

Initial review concluded that the Coastal Corridor has the least potential for high-speed rail service at maximum speeds exceeding 150 mph. While the Coastal Corridor has the highest population living within a conceptual 10-mile wide strip, it is due to concentrations in the Bay Area and in the Southern California metropolitan areas, rather than spread along the alignment between them. Coastal Corridor travel times between Los Angeles and the San Francisco Bay Area would be significantly longer than those with the other two corridors. This is due to challenging geography along the route, which also partially accounts for the lower population along the intermediate segments of the route. With significantly longer travel times, the projected ridership for this corridor is considerably lower overall. Moreover, this corridor has the highest projected capital costs due to environmental constraints.

These findings were presented to the Commission in May 1995. Based on these findings and the preliminary ridership forecasts, the Commission moved to redirect the focus of study to the I-5 and SR-99 corridors.

Subsequently, a more comprehensive evaluation of the I-5 and SR-99 corridors concluded that although the SR-99 Corridor options are somewhat more costly than the I-5 Corridor options, the SR-99 Corridor offers far better service to the growing Central Valley population, while still offering fast, competitive service between the Los Angeles and San Francisco Bay Area metropolitan regions. The SR-99 Corridor was also found to have the highest overall ridership potential. Additionally, testimony at Commission meetings and at public workshops indicated overwhelming public support for the SR-99 Corridor.

In December 1995, environmental evaluation findings on the two corridors were presented to the Commission. Engineering evaluation findings followed in February 1996. Following the February presentation, the Commission moved to focus further study on the SR-99 Corridor. This continues to be the focus for the current phase of project development by the Authority.

4.0 ALIGNMENT AND STATION EVALUATION

Previous studies showed four major alignment options running through the Central Valley region from Sacramento to Bakersfield. Two of these alignments generally represented existing railroad corridors and two represented new conceptual alignments along lines roughly west and east of State Highway 99. These are carried forward, with modifications, in the present evaluation process. Additional alignments were also developed to consider other existing railroad routes and to link the full number of proposed station sites in all the Central Valley station cities.

The existing rail corridors were evaluated as transportation corridors of historic standing that are already in railroad use. For purposes of this regional study, it is assumed that the high-speed train system would operate on additional right-of-way adjacent or very near to the existing rail routes, but would not share track or other operating property. The new line would entail accommodation with the physical and operating needs of the existing freight (and passenger) operations and share in the upgrading of these facilities where mutual benefits can be achieved within the High-Speed Rail program. The existing railroad corridors under consideration are as follows:

- Railroad operated by the Union Pacific Railroad (UP) in the Central Valley, most of which comprises the former Southern Pacific (SP) Railroad from Sacramento to Bakersfield and beyond to Mojave. Another segment, however, is represented by the former Western Pacific (WP) Railroad from Sacramento to just south of Stockton. These lines are color-coded red on the maps and charts in this report.
- Railroad operated by the Burlington Northern and Santa Fe Railway (BNSF) from Stockton to Bakersfield. This railroad is also the route of Amtrak's San Joaquin service from the Bay Area west of Stockton to its terminus in Bakersfield. These lines are color-coded blue on the maps and charts in this report.
- Railroad alignment of the Central California Traction Company (CCT) from Sacramento to Stockton. This route is partially out of service and partially used to provide freight service connecting freight customers in the City of Lodi to rail connections in Stockton. This line is color-coded yellow on the maps and charts in this report.

Two non-railroad corridors through lands not currently in transportation uses were examined previously to document the alternative investments required to construct a high-speed train system in environments that did not require accommodation with existing railroad operations. These corridors would roughly parallel the Highway 99 corridor at varying distances east and west of the highway. These have been updated for the current evaluation. The non-railroad corridors under consideration are as follows:

- West of Highway 99 (W99) from near Stockton to a point south of Bakersfield where the line would connect with a corridor to the Los Angeles area. This alignment has been modified from previous studies in an attempt to locate the corridor so as to minimize new environmental impacts as measured in several categories. These lines are color-coded green on the maps and charts in this report.
- East of Highway 99 (E99) from near Modesto to near Bakersfield. This alignment roughly follows the existing Highway 65 from Visalia and Porterville to Bakersfield and also relies on preliminary considerations by the California Department of Transportation (Caltrans) in its public description of a new freeway alignment from Madera County to Visalia. These lines are color-coded orange on the maps and charts in this report.

Prospective station sites have been identified in each of the seven station cities. These sites are the result of research in previous studies, new field work in the cities and extensive consultation with local officials, stakeholders and the public in the scoping and initial outreach phases of the EIR/EIS process. These proposed sites are described below.

The screening evaluation team has added new alignments as needed to connect the various station sites with the above-mentioned general high-speed through alignments. With this network of short connecting tracks in place, the station track alignments and the station sites are related in one of three ways:

- The station site is located along a high-speed through alignment, where the standard statewide intermediate station configuration is employed. That is, two high-speed tracks are flanked by two stopping tracks with platforms along a single alignment.
- The station site is located along a two-track stopping track alignment that departs from a high-speed through route to reach a two-track station with platforms where all trains stop. The stopping track alignment continues farther to rejoin the high-speed through alignment.
- Conversely, a two-track high-speed express through alignment has no station located along its extent. This alignment type is the complementary segment to the previously described stopping track alignment and is used by all trains not making a station stop in the city.

In addition, new alignments are also used to connect portions of the general alignments with each other where trains can cross from one alignment to another. These segments appear in critical locations near Stockton, Merced and Fresno, where crossing from one alignment to another may allow the most advantageous of each alignment's segments to be exploited for high-speed running.

Alignment Screening Considerations

For purposes of screening the implications of the alignment segments for this region, several fundamental assumptions have been carried throughout the analysis:

- The alignments have been designed for fully independent running of the high-speed trains. No joint use of track, and only rare instances of joint use of right-of-way with the existing freight railroads is foreseen in the region.
- High-speed right-of-way has been assumed to be located directly adjacent to, but not sharing, existing railroad rights-of-way. This assures the least amount of parcel severance in the region, except in isolated instances. New high-speed rights-of-way are 100 feet wide.
- Cost estimates for the high-speed train line in the region include grade separations only for the new high-speed infrastructure, even where contiguous to existing rail routes. Of course, joint improvements for the existing rail route may often be advantageous for the high-speed system, the freight railroad and the local community. The higher cost of these as yet unidentified or prioritized improvements has not been included in this phase of the analysis.

The interaction between station locations and alignment choices is perhaps the most significant regional aspect of the entire screening process. It is imperative that the alignment segments carried forward for further analysis safeguard a continuous high-speed through route for the entire length of the region. This is the only guarantee that travel times throughout the statewide high-speed train system will be low enough to provide attractive intercity services between Northern and Southern California and all points in between. At the same time, the location of stations within the region is of paramount importance to the achievement of local goals in the region. An innovative measure to defuse apparent conflicts between both essential goals is the use of express through routes. In effect, the four tracks of a typical high-

speed train station (two through tracks in the center, one stopping track with platform on each side) are separated from each other some distance from the station. The two through express tracks are routed around constrained urban areas, while the two stopping tracks connect to a two-track station location in an urban area. This requires right-of-way along two routes, an extra capital cost item, but the extra expenditure is be balanced against the cost of the full length of four-track right-of-way for standard configuration stations, where deceleration and acceleration distances will require upwards of 10 miles of station trackage. Also the express route rights-of-way outside cities will generally cost less to acquire and build than wider rights-of-way within developed areas. Conversely, a narrower two-track stopping track alignment in the urban area can fit into constrained urban areas, where a four-track right-of-way is unfeasible. The separation of the four tracks into express loop and stopping tracks is becoming known as the "Italian solution," after high-speed rail design in that country, where travel times have been shortened for nonstop or limited stop trains, while still utilizing extensive existing rail infrastructure at established stations in venerable cities. The incremental cost of using the split right-of-way solution in the Sacramento to Bakersfield region may be desirable in several cities in the Central Valley.

Standard Station Configuration

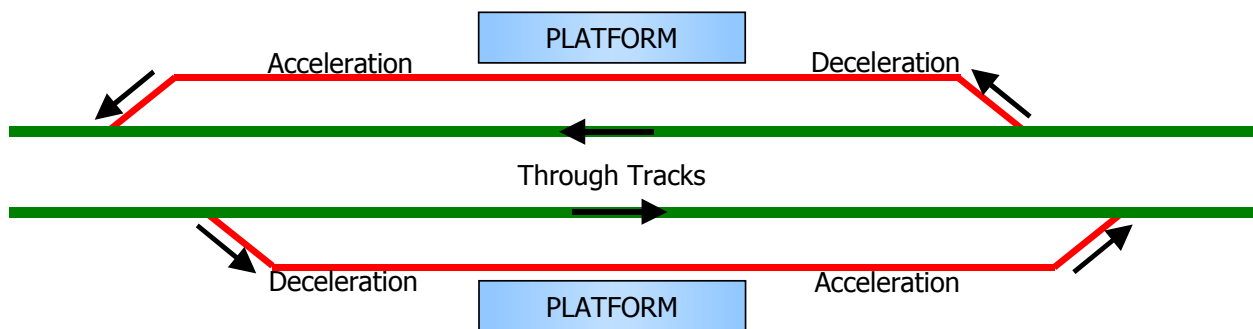


Figure 4.0.1

Express Loop Configuration

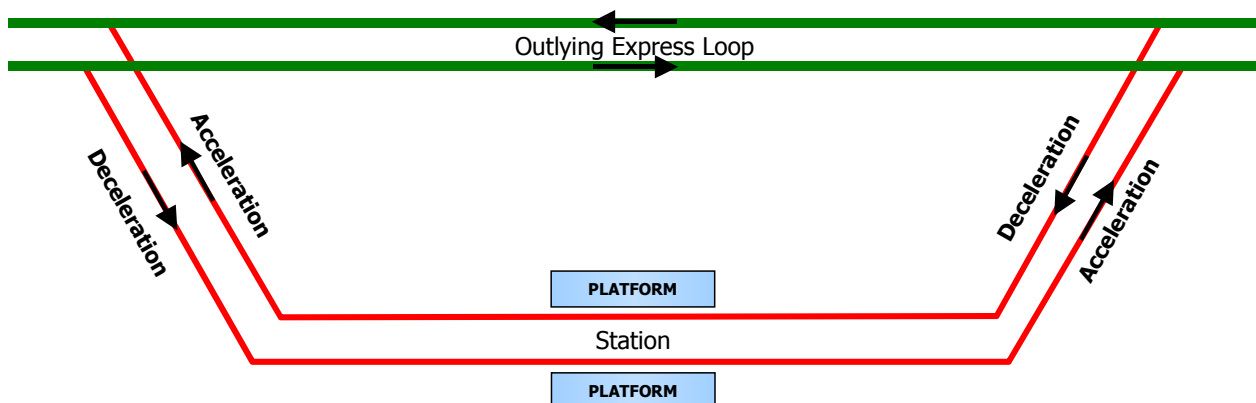


Figure 4.0.2

The following screening considerations are based on the characteristics of the four major routes through the region:

Southern Pacific and Western Pacific Routes

Planning: The route follows the Union Pacific (old SP) right-of-way from Sacramento to Bakersfield. Additionally the Western Pacific (WP) line is considered from Sacramento to Stockton. In the case of the SP, this is the oldest thoroughfare in the region and the basis of original development in the Central Valley, both for settlement patterns of the cities (downtown stations) and travel development (Highway 99). Therefore, the line runs through the most developed areas of the region. Simply put, the line goes through the population centers of the region, where ridership may be greater.

Engineering: The denser development along the line, both in cities and along the roads, will require the most modification to bridges and structures.

Cost: Per mile cost for the route is relatively high, due to the above considerations.

Environmental: There will be relatively more cultural resources affected along the route, as well as populations of residents and industries. Conversely, fewer wildlife and resource impacts will result from the route. While the line runs through cities and smaller settlements, large stretches of the line run through agricultural land between cities. While fewer parcels would be severed, the 100-foot right-of-way would impact only slightly less agricultural land as other alternatives.

Burlington Northern Santa Fe Route

Planning: The route follows the BNSF right-of-way from Stockton to Bakersfield. The line is the more direct of the rail routes from Stockton to Merced. South of Fresno the line bows out to the west away from the major developed areas, which are located on the arc of the SP and SR 99 Freeway. The line crosses the SP route in Stockton and Fresno and merges into it east of Bakersfield, but in general does not run close to the centers of any intermediate cities. The line touches fewer and smaller settlements.

Engineering: The line was constructed later than the SP, so there is less infrastructure developed around it. Therefore fewer structures need to be modified.

Cost: The above considerations make the route less costly to follow and only slightly more than on totally new right-of-way.

Environmental: There will be relatively fewer cultural resources along the route, as well as fewer affected populations. Conversely, more wildlife and resource impacts can be identified. Long stretches of the line run through extensive agricultural lands.

West of 99 (W99) Route:

Planning: A new western right-of-way would cut through lands roughly two to five miles west of the SR 99 Freeway from south of Stockton to Bakersfield. The route includes the high-speed through route alignment north and east of Stockton in the Sacramento to Stockton segment. The line proposed for the screening study has been modified from earlier studies to avoid some sensitive environmental impacts, such as wetlands, severance of agricultural parcels and threatened and endangered species. The line would skirt the western sides of the Central Valley's metropolitan areas. Stations on the line would be suburban in character and would be located where the new line crosses a major state highway running west from the metropolitan area. The new route would also constitute the most probable location of through tracks around urban station locations with the difference that no station would be located along the nonstop route.

Engineering: The line represents virgin right-of-way. A minimum number of structures would be constructed to assure the complete grade separation of the line and to retain the flexibility of agricultural operations near the line. However, the fencing of the line to thwart intrusion on the right-of-way would represent a significant new condition along the 270-mile route. Water crossings, such as rivers and canals also call for structures. In areas of traditional flooding, the line would be constructed on embankments of appropriate height.

Cost: The ability to run along a relatively straight line through the region would yield the shortest route with the lowest cost per mile.

Environmental: Minimal cultural resources would be impacted on a line not yet on any travel route. Impacts on agricultural lands would be higher on this route, mainly in the category of parcel segmentation, not in the total amount of land displaced, which will be similar on all routes through the Central Valley. Suburban stations would introduce development into the immediate station area, with lesser impacts along the access route from the cities.

East of 99 (E99) Route

Planning: The line is similar in concept to the W99 route. It would cut through lands roughly five or more miles east of the SR 99 Freeway from south of Stockton to Bakersfield. The line diverges from the BNSF route south of Stockton and rejoins the BNSF line south of Merced. It once again diverges north of Fresno before merging back toward the SP alignment just north of Bakersfield. In the Merced area, the line would be a loop from the BNSF that serves the new UC Merced campus and planned community. From a point in Madera County to Kern County, the line would follow a conceptual SR 65 Freeway alignment recently introduced by Caltrans for preliminary feasibility studies. Except in Merced and Visalia, stations on the line would lie considerably to the east of current development limits of the Central Valley metropolitan areas.

Engineering: As in the W99 route, the line represents virgin right-of-way. A minimum number of structures would be constructed to assure the complete grade separation of the line and to retain the flexibility of agricultural operations near the line. However, the fencing of the line to thwart intrusion on the right-of-way would represent a significant new condition along the 270-mile route. For much of its length, the route would set up a new travel path in agricultural lands. In addition, the line would skirt the edges of the Sierra foothills, introducing the need for cutting and filling in some areas and necessitating structures over watersheds coming down from the Sierras. As the line approaches Bakersfield, the landscape becomes hilly and traverses oilfields.

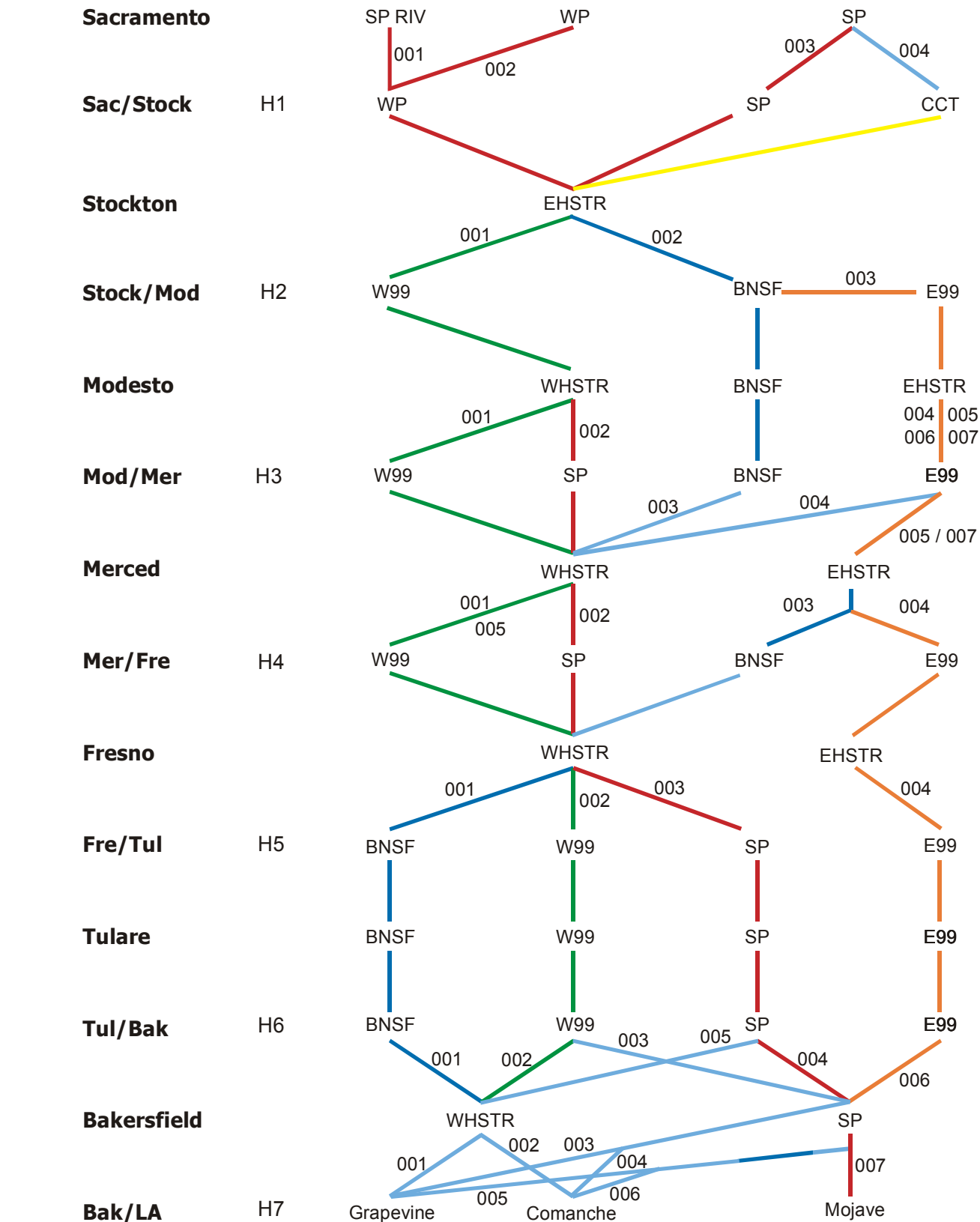
Cost: While cost per mile in valley floor areas would be as low as in the W99 route, due to minimal structures on a new route, costs would rise in foothill regions. Also the line is roughly 18 miles longer than the W99 route.

Environmental: Effects on cultural resources would be minimal along the new route. Agricultural issues would be similar to a new W99 route, but resource issues, such as water and wildlife impacts, are expected to be more significant.

Summary

The total network of feasible full-speed through routes in all segments of the Central Valley region are depicted in Figure 4.0.3 and Table 4.0.1.

Sacramento to Bakersfield High Speed Rail Through Routes



LEGEND

- | | | | |
|--------------|--|---------------|----------------------------------|
| CCT | Central California Traction | W99 | West of SR99 |
| SP / WP / UP | Southern Pacific/Western Pacific/Union Pacific | E99 | East of SR99 |
| BNSF | Burlington Northern Santa Fe | New Alignment | New Alignment |
| WHSTR | Western High Speed Through Route | EHSTR | Eastern High Speed Through Route |

Figure 4.0.3

Segments 1-7
Sacramento to Bakersfield
High-Speed Through Alignments

Alignment #	Description	Line Segments
H1001	SP River/ WP / EHS	101, 103, 106, 109, 111
H1002	WP / EHS	104, 106, 109, 111
H1003	SP EHS	105, 107, 110, 111
H1004	SP CCT EHS	105, 108, 110, 111
H2001	EHS W99	202, 209, 211
H2002	EHS BN	202, 208, 210, 214, 218, 219
H2003	EHS BN E99	202, 207, 208, 210, 214, 217, 222
H3001	W99	301, 308, 309, 317
H3002	W99 SP W99	301, 312, 313, 311, 317
H3003	BN W99	307, 316, 404, 317
H3004	E99 W99	306, 318, 319, 401, 403, 404, 317
H3005	E99	306, 318, 319, 401, 402, 406,
H4001	W99	405, 408, 413, 416, 417, 418
H4002	W99 SP W99	405, 409, 414, 419, 420, 417, 418
H4003	BN W99	407, 415, 420, 417, 418
H4004	BN E99	407, 427
H5001	W99 BN	501, 502, 511, 514
H5002	W99	501, 502, 508, 515
H5003	W99 SP	501, 503, 512, 517
H5004	E99	518
H6001	BN W99	601, 611, 610
H6002	W99	602, 609, 610
H6003	W99 SP	602, 608, 613, 701
H6004	SP	603, 605, 606, 613, 701
H6005	SP W99	603, 605, 606, 607, 610
H6006	E99 SP	604, 606, 613, 701
H7001	W99 Grapevine	708, 711, 720
H7002	W99 Comanche	708, 712, 715, 716, 722
H7003	Union I-5	706, 709, 713, 720
H7004	Union Comanche	706, 709, 714, 715, 716, 722
H7005	SP BN Grapevine	702, 703, 710, 718, 721
H7006	UP BN Comanche	702, 703, 710, 718, 722
H7007	UP Mojave	702, 703, 704, 705

4.1 ALTERNATIVE ALIGNMENT AND STATION OPTION COMPARISON

The Sacramento to Bakersfield regional alignments and station options have been divided into seven overall segments. These are defined in terms of city-to-city connections from north to south in the Central Valley. Station sites in Sacramento all start with the number 1 (S11, S12, etc.), as do all alignment segments from Sacramento to Stockton (101, 102, 103, etc.). Similarly, all Stockton station sites begin with the number 2 (S21, S22, etc.), as do alignment segments to Modesto (201, 202, 203, etc.). This continues to Bakersfield (7 series) with its connecting alignments to the Los Angeles area.

Furthermore, alignment segments are numbered to convey information about the station sites it connects in the two cities of each segment. Thus, alignments leaving Stockton station site S21 begin with the number 21, alignments reaching Modesto station site 31 end in 31. The resulting alignment from station 21 to 31 will thus be labeled A2131. Each alignment from station to station is made up of several discrete line segments, which are required for engineering and analysis purposes. For example, Alignment A2131 is composed of line segments 206, 208, 210, 213, 215. This information is given in a table for each station-to-station area and is also provided in diagrammatic form. The analytical comparisons and evaluation data will follow this introductory information.

The seven station-to-station areas, with all their varied connections, are being analyzed separately at this time, in order to identify the individual advantages and disadvantages of each discrete station site and alignment opportunity as measured by the engineering and environmental categories of the screening process. At a later time, variations in each station-to-station area can be strung together to construct through alignment options for the entire Sacramento to Bakersfield region.

4.1.1 Sacramento to Stockton Segment

This segment operates from the Central Valley terminal station in Sacramento to the next station city of Stockton. In the Sacramento area, five station sites have been evaluated. The alignments from these station sites are grouped into three general routes, which funnel into a single high-speed corridor running along the northeast quadrant of Stockton, and connect with three station sites in Stockton.

A. THE SACRAMENTO STATION SITES ARE:

S11 Sacramento Downtown

The high-speed train system would share a downtown Sacramento station site with the existing Amtrak depot, which is undergoing reconfiguration to allow for better use by Amtrak and Sacramento Rapid Transit. The proposed high-speed train system approach from a Third Street cut and cover tunnel would access a terminal located one level below the existing and future Amtrak Capital service and local transit uses. Ideally the tracks of the HSR terminal could be designed to conform to the angle of the upper level tracks to simplify construction issues. A maintenance yard may be located to the northeast beyond the terminal station tracks.

S12 Sacramento Curtis Park

The Curtis Park station would occupy portions of a former Western Pacific yard near the Sutterville Road overpass. The site is east of Sacramento City College. A Sacramento RT light rail station is also being built on part of the site.

S13 Sacramento Executive Airport

The Executive Airport terminal site would be reached by a new spur from the Southern Pacific River line in the vicinity of the existing air terminal at Blair Avenue. The exact location of the terminal and approach tracks must be coordinated with aviation requirements.

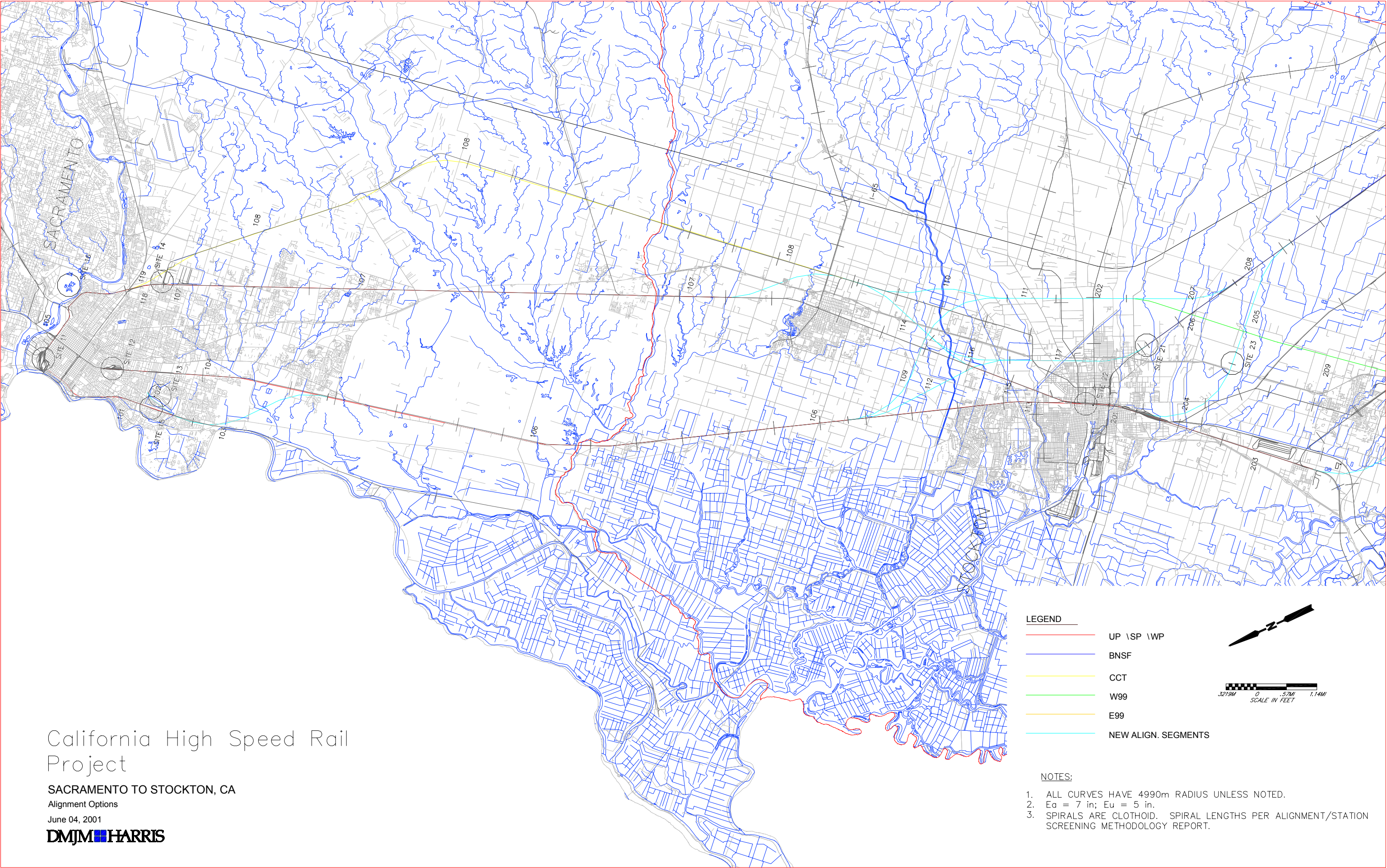
S14 Sacramento Power Inn Road

The Power Inn Road terminal site is located on Power Inn Road, south of the US 50 Freeway and north of Fruitridge Road. It could be served either by the Central California Traction alignment or by the Southern Pacific Fresno line. The exact orientation of the tracks would be governed by which approach was chosen.

S15 Sacramento Freeport West

The Freeport West site is a close variant of the Executive Airport site. It lies in a former freight yard west of Freeport Boulevard and south of Blair Avenue.

Another site in Sacramento, at the California Exposition Grounds, was suggested at the Sacramento town hall meeting, a part of the regional public outreach process. Engineering and environmental team members examined this site and found several negative characteristics. The site currently has no rail access or any immediately apparent corridors to provide it. It also lies within a natural/openspace/floodplain area, designated for Recreation by the City of Sacramento General Plan. Nearly 300 acres are riparian habitat, over 100 acres are wetlands, and three different types of threatened and endangered species are known to occur in the station area. It has thus been excluded from further consideration.



B. THE THREE SACRAMENTO ALIGNMENT GROUPINGS ARE:Southern Pacific River Route and Western Pacific (now all UP)

Line segments 101 and 106: A cut-and cover tunnel from Station Site 11, Downtown Sacramento, runs south along Third Street to south of the US 50 and I-5 interchange, then south up and over the I-5 freeway to meet with the Southern Pacific River line. Further south a wide S-curve in the Laguna/Elk Grove area connects to the Western Pacific main line to Stockton.

Line segment 102 connects this route to Station Site 13, Sacramento Executive Airport. Station Site 15, Sacramento Freeport West, is also on Line segment 101.

Station Site 12, Sacramento Curtis Park, lies completely on the Western Pacific line segments 104 and 106.

Southern Pacific Fresno line (now UP)

Line segments 105 and 107 are the Union Pacific mainline from Sacramento to Stockton via Lodi. This serves Station Site 11, Downtown Sacramento, and Station Site 14, Sacramento Power Inn Road.

Central California Traction (CCT)

Line segment 108 is the right-of-way of the Central California Traction Company (CCT). This short-line freight railroad operates at each end, at Sacramento and from Lodi to Stockton. The section from Sacramento to Lodi is out of service. The entire line is under study for alternative uses by the Sacramento Area Council of Governments. The CCT line begins at Station Site 14, Sacramento Power Inn Road.

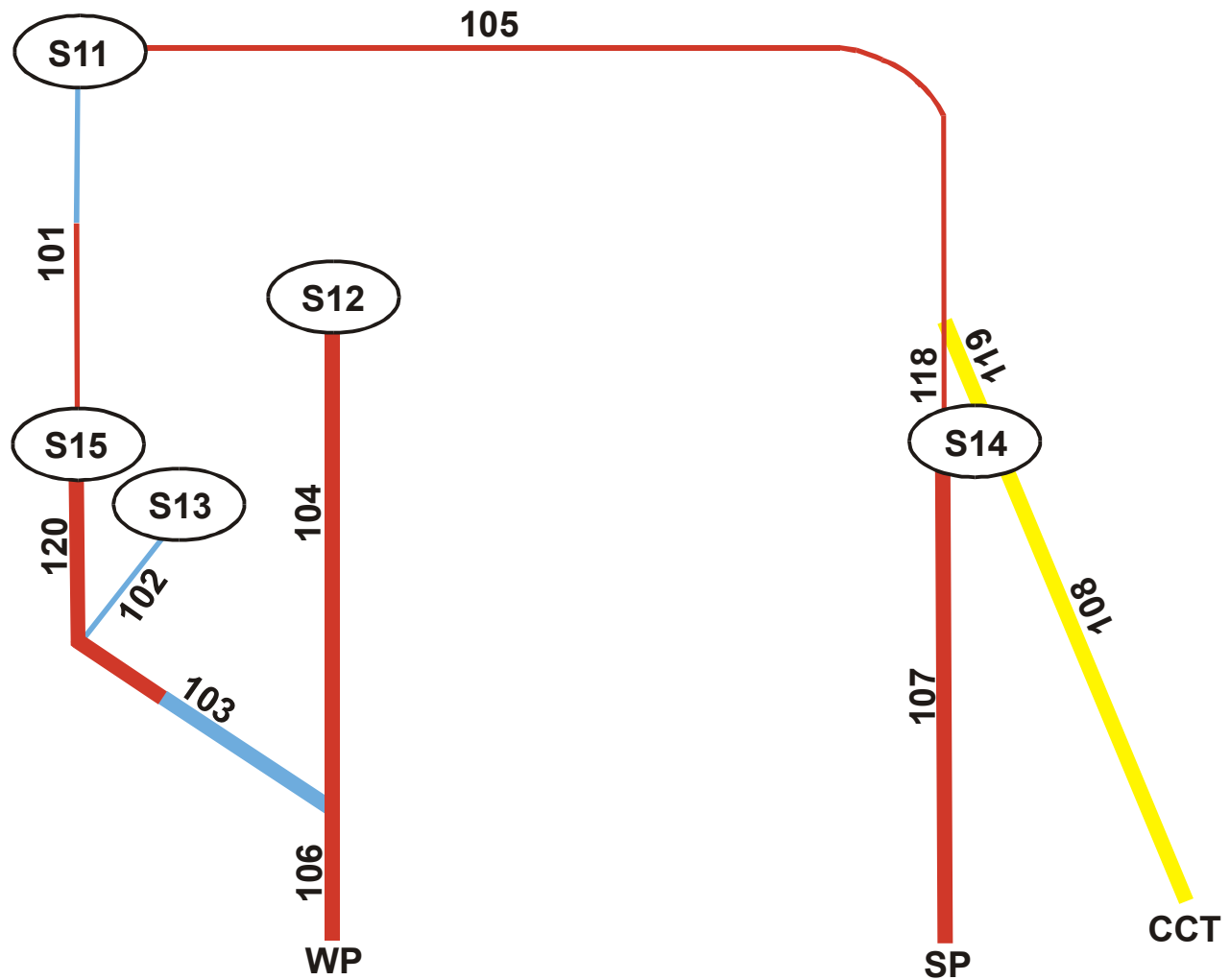
From Sacramento, the three alignment groupings approach a single high-speed through route around the northeast quadrant of the city of Stockton. The through route from the WP consists of line segments 106, 109 and 111. The through route from the SP consists of line segments 107, 110 and 111. The through route from the CCT consists of line segments 108, 110 and 111.

Station Site 21, Stockton Farmington Road, can be reached by stopping track alignments. From the WP, these are line segments 112 and 117. From the SP and the CCT, these are line segments 114, 116 and 117.

Station Site 22, Stockton ACE Downtown, can be reached from the WP on a stopping track alignment consisting of line segment 113. The SP approach to downtown consists of line segments 114 and 115.

Station Site 23, Stockton Airport, uses the same approaching line segments as Station 22, Stockton ACE downtown, with the addition of upgraded UP rail line segment 201 and new line segment 204.

Sacramento Stations Track Alignments



Legend


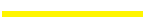










High Speed Through Route	Station Track
	 CCT
	 SP / WP / UP
	 BNSF
	 W99
	 E99
	 New Alignment

Figure 4.1.1B

Table 4.1.1B

Segment 1
Sacramento to Stockton
Station to Station Alignments

Alignment #	Stations	Line Segments	Associated Through Line Segments
A1121A	S11 Sacramento Downtown to S21 Stockton Farmington Road via WP	101, 120, 103, 106, 112, 117	113
A1121B	S11 Sacramento Downtown to S21 Stockton Farmington Road via SP	105, 118, 107, 114, 116, 117	110, 111
A1121C	S11 Sacramento Downtown to S21 Stockton Farmington Road via CCT	105, 119, 108, 114, 116, 117	110, 111
A1122A	S11 Sacramento Downtown to S22 Stockton ACE Downtown via WP	101, 120, 103, 106, 113	N/A
A1122B	S11 Sacramento Downtown to S22 Stockton ACE Downtown via SP	105, 118, 107, 114, 115	110, 111
A1122C	S11 Sacramento Downtown to S22 Stockton ACE Downtown via CCT	105, 119, 108, 114, 115	110, 111
A1123A	S11 Sacramento Downtown to S23 Stockton Airport via WP	101, 120, 103, 106, 113, 201, 204	109, 111
A1123B	S11 Sacramento Downtown to S23 Stockton Airport via SP	105, 118, 107, 114, 115, 201, 204	110, 111
A1123C	S11 Sacramento Downtown to S23 Stockton Airport via CCT	105, 119, 108, 114, 115, 201, 204	110, 111
A1221	S12 Sacramento Curtis Park to S21 Stockton Farmington Road	104, 106, 112, 117	109, 111
A1222	S12 Sacramento Curtis Park to S22 Stockton ACE Downtown	104, 106, 113	109, 111
A1223	S12 Sacramento Curtis Park to S23 Stockton Airport	104, 106, 113, 201, 204	109, 111
A1321	S13 Sacramento Executive Airport to S21 Stockton Farmington Road	102, 103, 106, 112, 117	109, 111
A1322	S13 Sacramento Executive Airport to S22 Stockton ACE Downtown	102, 103, 106, 113	109, 111
A1323	S13 Sacramento Executive Airport to S23 Stockton Airport	102, 103, 106, 113, 201, 204	109, 111
A1421A	S14 Sacramento Power Inn Road to S21 Stockton Farmington Road via SP	107, 114, 116, 117	110, 111
A1421B	S14 Sacramento Power Inn Road to S21 Stockton Farmington Road via CCT	108, 114, 116, 117	110, 111
A1422A	S14 Sacramento Power Inn Road to S22 Stockton ACE Downtown via SP	107, 114, 115	110, 111
A1422B	S14 Sacramento Power Inn Road to S22 Stockton ACE Downtown via CCT	108, 114, 115	110, 111
A1423A	S14 Sacramento Power Inn Road to S23 Stockton Airport via SP	107, 114, 115, 201, 204	110, 111
A1423B	S14 Sacramento Power Inn Road to S23 Stockton Airport via CCT	108, 114, 115, 201, 204	110, 111
A1521	S15 Sacramento Freeport West to S21 Stockton Farmington Road	120, 103, 106, 112, 117	109, 111
A1522	S15 Sacramento Freeport West to S22 Stockton ACE Downtown	120, 103, 106, 113	109, 111
A1523	S15 Sacramento Freeport West to S23 Stockton Airport	120, 103, 106, 113, 201, 204	109, 111

C. STATION SCREENING CONSIDERATIONS

S11 Sacramento Downtown

Planning: The downtown station site shows high intermodal connectivity and compatibility of land uses in the capital region. Connections to expanding Amtrak Capital Corridor services from the Bay Area and a planned light rail connection to the local RT transit network are strong links to the entire region. The site is in walking distance of the State Capitol, downtown offices and Old Sacramento. The preservation and reuse of the historic depot and Central Pacific shops are currently the subject of planning efforts.

Engineering: The most promising access to the station is via a cut-and-cover tunnel from the south under 3rd Street. This will require HSR platforms to be at a lower level from existing and/or relocated freight and passenger platforms. Since the site is close to the Sacramento River, strong water control measures will be required, such as impervious walls and dewatering pumping equipment. A significant design coordination effort is also required with Union Pacific, Amtrak, RT and developer specifications for the site. All these factors will involve substantial capital costs. It is important to note that the terminal site can accommodate a run-through track pattern to reach a maintenance facility east of the station without interfering with scheduled train operations.

If the more difficult eastern approach via the SP Fresno line (Line Segment 105) is used, the station can be located on an upper level, avoiding some of the water-related challenges. However, the access to maintenance facilities will be via the same yard throat as the scheduled train operations.

Cost: This terminal station will be located downtown in an active freight yard and will be the most costly site in the Central Valley region.

Environmental: The Downtown site poses no impacts on wetlands, sensitive habitat, or natural streams, and negligible disturbance to public parks and recreational areas. Flood hazards, however, may be a concern since half of the station area is in the 100-year floodplain. Although the land uses in the station area are compatible with a HSR station, this site could have potential impacts on minorities (4,100 persons) and nationally registered historic sites (7).

S12 Sacramento Curtis Park

Planning: The Curtis Park station site is part of a former Western Pacific (now UP) rail yard close to downtown Sacramento, but not within walking distance of the city core. Connectivity is limited, but will be improved by the South Line of the RT light rail network, which shares this alignment and site. Surrounding residential uses are less compatible with the scope and function of a terminal HSR station. The arterial street grid, especially 12th Street and Sutterville Road will need expansion to accommodate station access.

Engineering: The site would be a stub end terminal station. Maintenance facilities must be located south of the site and have access through the yard throat. The site presents no major issues beyond the accommodation of freight traffic and RT light rail traffic on parts of the site.

Cost: A terminal station at this site would be moderate in cost, since it would occupy an essentially cleared site and would not reach into the central core of the city.

Environmental: Nearly the entire Curtis Park site (97.5%) is flood-prone and characterized by land uses that would be considered incompatible with a HSR station

(residential and open space uses). In addition, it potentially affects a significant number of ethnic minorities, two nationally registered historic sites, and nearly 21 acres of eight different public parks and recreation areas. This station site would not affect wetlands, farmlands, natural streams, or sensitive wildlife habitat

S13 Sacramento Executive Airport

Planning: The Executive Airport site would share the site of the general aviation airport south of Sacramento downtown. This large site is already in transportation use. Access is from Freeport Blvd., an arterial highway.

Engineering: The exact location of the HSR station would be determined by design coordination with the airport management agency. Some rearrangement of parking and possibly some inexpensive structures, such as hangars, may be necessary to optimize terminal operations for both HSR and airport. The HSR line would enter the airport area on an overpass from the SP River Line, which parallels Freeport Blvd.

Cost: A terminal station at this site would be moderate in cost, since it would occupy an easy to clear site and would not reach into the central core of the city.

Environmental: This site would result in few environmental, cultural, or socioeconomic impacts. Specifically, the Executive Airport site would not affect wetlands, natural streams, sensitive wildlife habitat, farmlands, nationally registered historic sites, or public parks and recreation areas. 15% of the site and surrounding vicinity are occupied by land uses that would be considered incompatible and visually sensitive to a HSR station. However, this site would pose environmental justice concerns and lies entirely within the 100-year floodplain.

S14 Sacramento Power Inn Road

Planning: The Power Inn Road site is a suburban alternative to a downtown terminus for the Sacramento area. Its location to the east of the city makes it accessible to the growing suburban region of Sacramento. However, it is the farthest station from the downtown business and governmental core of the city. Intermodal access is good, with light rail transit, Folsom Road and the US 50 Freeway all within one to two miles from the site. Surrounding uses are industrial.

Engineering: A station here could be oriented either to the SP Fresno line or to the partially unused Central California Traction right-of-way. In either case, maintenance facilities could be located nearby; access, however, would be through the yard throat, mixed with scheduled train operations.

Environmental: Although the Power Inn Road site would not affect wetlands, farmlands, natural streams, nationally registered historic sites, or environmental justice communities, it poses a potential threat to two sensitive biological species, resides almost entirely within the 100-year floodplain, and affects a small area of public parks and recreational areas. About 40% of the station vicinity are occupied by land uses considered incompatible with a HSR station.

S15 Sacramento Freeport West

Planning: The Freeport West Station exhibits the same characteristics and uses the same right-of-way as the S13 Executive Airport site. The site is closer to residential uses and has relatively less arterial highway access than the Airport site.

Engineering: The site lies within the SP River line alignment and does not require a bridge over Freeport Blvd. or any reconfiguration of the Executive Airport. The site could be used as a temporary terminus on the same alignment to the S11 Downtown site, if design and funding of that option is deferred to a later time. This location may also be used as a maintenance facility site for the S13 Executive Airport station site.

















Cost: A terminal station at this site would be moderate in cost, since it would occupy an easy to clear site and would not reach into the central core of the city.

Environmental: This site would not affect wetlands, farmlands, natural streams, or sensitive wildlife habitat. However, the Freeport West site would be surrounded by a high percentage of incompatible land uses (78%, of which most is residential land uses), results in significant floodplain encroachment (80%), and affect minorities and a public park.

Table 4.1.1C
Sacramento to Bakersfield - High-Speed Train Station Alignment Evaluation Matrix
Sacramento Stations

Evaluation Criteria	Station S11 Sacramento Downtown	Station S12 Sacramento Curtis Park	Station S13 Sacramento Executive Airport	Station S14 Sacramento Power Inn Road
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Population/Employment Catchment				
	●	◐	◐	◐
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	<ul style="list-style-type: none"> Downtown station. Freeway access: ¼ mile from I-5 Street access: On street grid as planned by city Parking: Parking area adequate, but not adjacent to station. Transit: RT LRT and bus to be at site. Other rail: Amtrak Capital service to Bay Area and Sierra foothills 	<ul style="list-style-type: none"> Near downtown station site. Freeway access: to east from SR99 Street access: Arterial access from Sutterville Rd/12th St. Limited street grid. Parking: Parking adequate at site. Transit: RT LRT line and Sacramento City College station under construction in same r-o-w. Other rail: 	Suburban location Freeway access: I-5 Florin and Fruitridge ramps ca. 2 miles Street access: Arterial access from Freeport Bl Parking on airport site. Transit: Bus access only.	Suburban industrial site. Freeway access: US 50, 1 ½ mi Arterial access: Power Inn Road, Folsom Road (1 mi) Parking adequate at site. Transit: RT Folsom line 1 mi.
	●	◐	◐	◐
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Evaluation Criteria	Station S11 Sacramento Downtown	Station S12 Sacramento Curtis Park	Station S13 Sacramento Executive Airport	Station S14 Sacramento Power Inn Road
Operational Issues	<ul style="list-style-type: none"> Terminal station: maintenance yard can be east of station on through track ladder. HSR on lower level; Amtrak and RT on street level; needs design coordination. 	<ul style="list-style-type: none"> Terminal station must be stub ended at the site; maintenance facilities must be accessed through station track throat. Must accommodate RT LRT and through freight traffic. 	<ul style="list-style-type: none"> Terminal station must be stub ended at the site; maintenance facilities must be accessed through station track throat. 	Existing freight on both SP and CCT lines.
Construction Issues	Lower level station on high watertable site requires retaining walls/levees and pumping equip. Cut and cover tunnels on 3 rd St. Phasing with Amtrak and RT makes design coordination essential.	Area is flat land in a former rail yard of the Western Pacific (UP). Surrounding uses, including LRT and through freight, trains must be accommodated.	No exceptional problems on the ground. Some relocation of aviation outbuildings and airport parking.	Reconfiguration of freight routes and siding access.
Capital Cost	Very high costs, due to underground location, tunneling and design coordination	Moderate costs	Moderate costs	Moderate costs
Right-of-Way Issues/Cost	Historical site with railroad uses. Cut and cover under city streets.	No right-of-way problems. UP and RT ownership.	No right-of-way problems. City-owned land.	Existing railroad land.
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	30.68	97.46	14.63	42.17
Primary Land Uses (acreage) within station area	Industrial (51); Institutional (101); Transportation (220)	Institutional (85); Open Space (97); Residential (202)	Residential (65); Transportation (388)	Industrial (221); Open Space (48); Residential (106)
Rank				

Evaluation Criteria	Station S11 Sacramento Downtown	Station S12 Sacramento Curtis Park	Station S13 Sacramento Executive Airport	Station S14 Sacramento Power Inn Road
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	30.68	97.46	14.63	42.17
Number of scenic corridor and scenic river crossings	0	0	0	0
Rank				
<i>5 Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	0	0	0	0
Number of Wetland Crossings	0	0	0	0
Total Acreage of Wetlands within Station Area	0	0	0	0
Rank				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	3	1	1	1
Total Acreage of FEMA Floodplain Crossings within Station Area	241.11	443.87	503.02	497.26
Rank				
Threatened & Endangered Species Impacts				
Count of Species	0	0	0	2
Acreage of Sensitive Habitat within Station Area	0	0	0	0
Rank				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				

Evaluation Criteria	Station S11 Sacramento Downtown	Station S12 Sacramento Curtis Park	Station S13 Sacramento Executive Airport	Station S14 Sacramento Power Inn Road
Minority Within 1,400' Buffer – 1990 Population	4100	1734	2227	40
Low Income Within 1,400' Buffer – 1990 Households	0	0	0	0
Rank				
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	0	0	0	0
Rank				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	7	2	0	0
Rank				
Parks & Recreation/Wildlife Refuge Impacts				
Count of Parks/Recreation Areas	1	8	0	10
Total Acreage Parks/Recreation Areas in Station Area	0.01	20.67	0	0.05
Rank				

Evaluation Criteria	Station S11 Sacramento Downtown	Station S12 Sacramento Curtis Park	Station S13 Sacramento Executive Airport	Station S14 Sacramento Power Inn Road
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				





















 Least Favorable Most Favorable

Table 4.1.1C continued
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Sacramento Stations

Evaluation Criteria	Station S15 Sacramento Freeport West	Station S16 Sacramento Cal Expo		
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable	Not Applicable		
Length	Not Applicable	Not Applicable		
Population/Employment Catchment				
	⌚	⌚		
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Suburban location Freeway access: I-5 Florin and Fruitridge ramps ca. 2 miles Street access: Arterial access from Freeport Bl and Blair Av. Parking adequate at site. Transit: Bus access only.	Suburban location Freeway access: I-80 Business ½ mi Transit: Bus ca ½ mi No rail access.		
	⌚	○		
<i>Minimize Operating and Capital Costs.</i>				
Length	N/A	N/A		
Operational Issues	Unused right-of-way at present.	Not on any existing rail route.		
	●	○		

Evaluation Criteria	Station S15 Sacramento Freeport West	Station S16 Sacramento Cal Expo		
Construction Issues	Possible flooding issues.	Flood danger high. New bridge needed over American River		
				
Capital Cost	Moderate costs	Unassessed, but floodplain mitigation relatively high cost item.		
				
Right-of-Way Issues/Cost	Existing city-owned land and railroad right-of-way	Need for new alignment. Shared use with Cal Expo.		
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	78.45			
Primary Land Uses (acreage) within station area	Institutional (40); Residential (254); Transportation (49)			
Rank				
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	78.45			
Number of scenic corridor and scenic river crossings	0			
Rank				

Evaluation Criteria	Station S15 Sacramento Freeport West	Station S16 Sacramento Cal Expo		
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	0			
Number of Wetland Crossings	0			
Total Acreage of Wetlands within Station Area	0			
Rank				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	1			
Total Acreage of FEMA Floodplain Crossings within Station Area	404.70			
Rank				
Threatened & Endangered Species Impacts				
Count of Species	0			
Acreage of Sensitive Habitat within Station Area	0			
Rank				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	2696			
Low Income Within 1,400' Buffer – 1990 Households	0			
Rank				

Evaluation Criteria	Station S15 Sacramento Freeport West	Station S16 Sacramento Cal Expo		
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	0			
Rank				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0			
Rank				
Parks & Recreation/Wildlife Refuge Impacts				
Count of Parks/Recreation Areas	1			
Total Acreage Parks/Recreation Areas in Station Area	9.91			
Rank				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				

Evaluation Criteria	Station S15 Sacramento Freeport West	Station S16 Sacramento Cal Expo		
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				



D. ALIGNMENT SCREENING CONSIDERATIONS

Downtown Sacramento can be reached by two distinctive routes. A western route (WP) would exit the station area to the south in a tunnel under Third Street, follow the SP River line between the Sacramento River and the I-5 Freeway. A new connection in the Laguna area would join the line to the WP mainline toward Stockton. The line has no significant sharp curves and can be engineered to provide high-speed (220 mph) operation to within the normal deceleration distance to the station. One substandard curve (90 mph) would still be adequate to accommodate normal train speeds on the station approach. Environmentally the line runs close to parklands and traverses an area of wetlands south of the city. The line is the shortest to S21 Stockton Farmington Road by a nominal distance, but significantly shorter to S22 Stockton ACE Downtown or S23 Stockton Airport.

An eastern route (SP) would follow the existing SP Fresno line from downtown to an embankment going south near California State University Sacramento. The study assumes that the right-of-way could be shared and modified with structures to allow separate running by high-speed trains, because substandard curves force lower than standard speeds for about six miles from the station, which adds about 2 minutes of travel time. The line runs through residential neighborhoods and is lined by industrial facilities for several miles. The line also crosses the WP freight route and an RT light rail route. The alignment assumes a high-speed bypass of the City of Lodi to avoid construction costs and environmental impacts through the center of that city.

Other alignments from Sacramento start from various terminals short of downtown. The WP alignment from Curtis Park is the straightest connection to the Stockton area. The WP also forms the major part of alignments from the Executive Airport and Freeport West stations.

Alignments from Power Inn Road do not use the most constrained part of the SP alignment to downtown Sacramento. Power Inn Road is also served by a third route through the segment, the Central California Traction (CCT) right-of-way. This alignment is narrow and is the longest in the segment, which adds almost four minutes to the shortest travel time to downtown, via the SP eastern alignment. Connection to the existing rail lines in the Stockton area is difficult, but connecting to a new high-speed line near Stockton would be possible.

Approaching Stockton, the various alignments converge on a northeastern high-speed through route, which can funnel through trains toward the south. The alignment runs through mostly open land. An alignment to the S21 Farmington Road station parallel to the SR 99 Freeway forms an alternate high-speed approach on structure, but is suited more to two-track than four-track station approach. This fact suggests that even the S21 Farmington Road site is better considered as an off-line station, like the others in Stockton.

An approach to the S22 Stockton Downtown station travels through built-up areas, requiring aerial or trench alignments. Constraints both north and south of the station site only allow a two-track stopping alignment to this site. The S23 Stockton Airport lies on this same alignment through downtown Stockton and thus would incur the same construction and operating constraints as the downtown station site.

Overview of Environmental Impacts on the 24 Alignment Variations

Each combination was evaluated using 9 evaluation criteria. These were

- Land use compatibility and conflicts
- Visual quality impacts
- Water resources impacts

- Floodplain impacts
- Threatened and endangered species impacts
- Environmental justice impacts
- Farmland impacts
- Cultural resource impacts
- Parks and recreation/wildlife refuge impacts

Two alignments exhibit the fewest impacts. These are:

- A1421B, running from Sacramento Power Inn Road to Stockton Farmington Road via CCT, and
- A1422B, running from Sacramento Power Inn Road to Stockton ACE Downtown via CCT.

They were rated to be in the lowest-level impact category for each criterion, except land use compatibility and farmland impacts.

Four alignments had slightly more impacts. This cluster of alignments with the next fewest impacts are:

- A1121C Sacramento Downtown to Stockton Farmington Road via CCT
- A1122B Sacramento Downtown to Stockton ACE Downtown via SP
- A1422A Sacramento Power Inn Road to Stockton ACE Downtown via SP, and
- A1423B Sacramento Power Inn Road to Stockton Airport via CCT.

The Sacramento Downtown alignments (A1121C and A1122B) each had greater land use compatibility and floodplain impacts than the Sacramento Power Inn Road alignments. Of the four, the Sacramento Power Inn Road to Stockton ACE Downtown alignment (A1422A) had the greatest impact on threatened and endangered species, but had the least impact on farmland.

















Fifteen of the alternative alignments between Sacramento Station locations and Stockton Station locations were intermediate in the range of impacts they exhibited, and fell between the six alignments noted above and five alignments exhibiting the greatest number of impacts.

























Five alignments with the greatest impacts are:

















- A1121A Sacramento Downtown to Stockton Farmington Road via WP
- A1122C Sacramento Downtown to Stockton ACE Downtown via CCT
- A1123A Sacramento Downtown to Stockton Airport via WP
- A1521 Sacramento Freeport West to Stockton Farmington Road, and
- A1523 Sacramento Freeport West to Stockton Airport

All of these five alignments exhibit more impacts in nearly every environmental category, as compared to the six lower-impact alignments noted above. In general, these five exhibited the greatest increase in impacts on floodplains, threatened and endangered species, and parks and recreation when compared to the six. They also tended to have greater impacts on water resources, environmental justice, and farmland.

Table 4.1.1D
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Sacramento to Stockton Alignment

















Evaluation Criteria	Alignment A1121A	Alignment A1121B	Alignment A1121C	Alignment A1122A
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 17.04 minutes Mag 14.96 minutes	VHS 20.41 minutes Mag 18.40 minutes	VHS 20.90 minutes Mag 18.85 minutes	VHS 15.94 minutes Mag 13.94 minutes
				
Length	49.94 miles 80.36 km	50.99 miles 82.06 km	52.79 miles 84.95 km	45.88 miles 73.84 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Shortest of the three A1121 alternatives	Most costly of the three A1121 alternatives	Least costly of the three A1121 alternatives	Shortest and least costly of the three A1122 alternatives
				
Operational Issues	Sub std curve ±2 miles from Sac. Sta. 90 mph	Sub std curves first ±6 miles in Sac.	Sub std curves first ±6 miles in Sac.	Sub std curve ±2 miles from Sac. Sta. 90 mph. Requires HSR through track @ Stockton
				

Evaluation Criteria	Alignment A1121A	Alignment A1121B	Alignment A1121C	Alignment A1122A
Construction Issues	Cut and cover tunnel @ Sac I-80/I-5 interchange SR99 structure @ Stockton	Structure and ROW first 6 miles in Sac. SR99 structure	Structure and ROW first 6 miles in Sac. SR99 structure	Cut and cover tunnel @ Sac I-80/I-5 interchange SR99 structure @ Stockton
				
Capital Cost	High cost because of Sacramento construction	High cost because of Sacramento construction	High Cost because of Sacramento construction.	Very high cost because of Sacramento and Stockton downtown construction.
				
Right-of-Way Issues/Cost	Cut and cover tunnel Proximity to River Park	Heavy freight use in ROW. Most built up ROW and most expensive of the 3 A1121 alternatives.	Existing freight ROW narrow.	High speed through route required in Stockton Cut and cover tunnel Proximity to River Park
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	37.95	35.54	41.49	38.83
				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	2.00	1.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	16.00	38.00	36.00	14.00
Number of Wetland Crossings	27.00	20.00	10.00	27.00
Total Acreage of Wetlands Within ROW	27.23	17.34	12.56	27.23
RANKING				

















Evaluation Criteria	Alignment A1121A	Alignment A1121B	Alignment A1121C	Alignment A1122A
Floodplain Impacts				
Number of FEMA Floodplain Crossings	6.00	5.00	5.00	5.00
Associated Length (meters) of Floodplain Crossings	26463.39	16178.14	15375.82	24361.05
Total Acreage of FEMA Floodplain Crossings	153.74	101.92	91.41	137.88
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	26.00	25.00	16.00	27.00
Count of Species along ROW	2.00	4.00	6.00	2.00
Sensitive Habitat Acreage w/in ROW	23.79	33.85	0.00	23.79
Net Sensitive Habitat Acreage along ROW	72.00	95.57	0.00	72.00
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	27758.00	10277.00	8352.00	36337.00
Low Income Within 1,400' Buffer – 1990 Households	187.00	0.00	0.00	187.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	323.15	205.08	277.38	281.07
RANKING				

Evaluation Criteria	Alignment A1121A	Alignment A1121B	Alignment A1121C	Alignment A1122A
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	1.00	1.00	0.00	1.00
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	36.71	0.59	0.45	36.71
Total Acreage of Parks/Recreation Areas along ROW	116.78	3.54	2.29	116.78
Incidences of Parks/Recreation Areas in ROW	4.00	3.00	2.00	4.00
Incidences of Parks/Recreation Areas along ROW	0.00	6.00	1.00	0.00
RANKING	○	●	●	○
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.1D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Sacramento to Stockton Alignment

















Evaluation Criteria	Alignment A1122B	Alignment A1122C	Alignment A1123A	Alignment A1123B
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 19.16 minutes Mag 17.25 minutes	VHS 19.65 minutes Mag 17.70 minutes	VHS 18.07 minutes Mag 15.90 minutes	VHS 21.29 minutes Mag 19.21 minutes
				
Length	46.40 miles 74.67 km	48.20 miles 77.56 km	53.70 miles 86.43 km	54.22 miles 87.26 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Most costly of the three A1122 alternatives	Longest of the three A1122 alternatives	Shortest of the three A1123 alternatives	Most costly of the three A1123 alternatives
				
Operational Issues	Structure and ROW first 6 miles from Sac. Requires HSR through track @ Stockton.	Structure and ROW first 6 miles from Sac. Requires HSR through track @ Stockton.	Sub std. curve \pm 90 mph \pm 2 miles from Sac. Sta. Requires HSR through track @ Stockton.	Structure and ROW first 6 miles from Sac. Requires HSR through track @ Stockton.
				

























Evaluation Criteria	Alignment A1122B	Alignment A1122C	Alignment A1123A	Alignment A1123B
Construction Issues	Structure in Sac and Stockton	Structure in Sac and Stockton	Cut and cover tunnel in Sac. I-80/I-5 interchange structure in Stockton	Structure in Sac and Stockton
Capital Cost	Very high cost because of Sacramento and Stockton downtown construction and SP right of way.	High cost because of Sacramento and Stockton downtown construction, but low cost on CCT between.	High cost because of Sacramento downtown and SR99 structure in Stockton	High cost because of Sacramento downtown and SR99 structure in Fresno
Right-of-Way Issues/Cost	Structure and ROW first 6 miles in Sac. Structure in Stockton. HSR through route required in Stockton	Structure and ROW first 6 miles in Sac. Structure in Stockton. HSR through route required in Stockton	Cut and cover tunnel @ Sac I-80/I-5 interchange. Structure in Stockton. HSR through route required in Stockton	Structure and ROW first 6 miles in Sac. Structure in Stockton. HSR through route required in Stockton
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	41.87	39.36	33.27	31.08
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	1.00	1.00	2.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	34.00	14.00	17.00	39.00
Number of Wetland Crossings	10.00	27.00	30.00	23.00
Total Acreage of Wetlands Within ROW	13.25	27.23	28.54	19.34
RANKING				

















Evaluation Criteria	Alignment A1122B	Alignment A1122C	Alignment A1123A	Alignment A1123B
Floodplain Impacts				
Number of FEMA Floodplain Crossings	5.00	6.00	8.00	8.00
Associated Length (meters) of Floodplain Crossings	13339.16	28227.03	29192.94	18973.36
Total Acreage of FEMA Floodplain Crossings	75.90	152.45	164.18	112.71
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	15.00	27.00	30.00	27.00
Count of Species along ROW	5.00	2.00	2.00	3.00
Sensitive Habitat Acreage w/in ROW	0.00	23.79	23.79	33.85
Net Sensitive Habitat Acreage along ROW	0.00	72.00	72.00	95.57
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	9068.00	41070.00	40171.00	14827.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	187.00	187.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	250.05	281.07	345.58	242.27
RANKING				

Evaluation Criteria	Alignment A1122B	Alignment A1122C	Alignment A1123A	Alignment A1123B
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	1.00	1.00	1.00
RANKING	●	◐	◑	◐
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.02	36.71	36.71	0.16
Total Acreage of Parks/Recreation Areas along ROW	0.12	116.78	116.78	1.37
Incidences of Parks/Recreation Areas in ROW	1.00	4.00	4.00	2.00
Incidences of Parks/Recreation Areas along ROW	1.00	0.00	0.00	6.00
RANKING	●	○	○	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.1D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Sacramento to Stockton Alignment

















Evaluation Criteria	Alignment A1123C	Alignment A1221	Alignment A1222	Alignment A1223
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 21.78 minutes Mag 19.66 minutes	VHS 16.21 minutes Mag 14.19 minutes	VHS 15.11 minutes Mag 13.18 minutes	VHS 17.24 minutes Mag 15.14 minutes
				
Length	56.02 miles 90.15 km	46.88 miles 75.45 km	42.83 miles 68.93 km	50.65 miles 81.52 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Longest and least costly of the three A1123 alternatives	Relatively inexpensive and short	Moderate cost and short	Moderate cost and length
				
Operational Issues	Structure and ROW first 6 miles in Sac. Requires HSR through track in Stockton	Freight RR + LRT coordination in Sac.	Freight RR + LRT coordination in Sac. Freight coordination in Stockton. HSR through route required in Stockton	Freight RR + LRT coordination in Sac. Freight coordination in Stockton. HSR through route required in Stockton
				

























Evaluation Criteria	Alignment A1123C	Alignment A1221	Alignment A1222	Alignment A1223
Construction Issues	Structure/ROW first 6 miles in Sac.	SR99 structure in Stockton	Structure/ROW in Stockton	Structure/ROW in Stockton
				
Capital Cost	High cost because of Sacramento downtown and SR99 structure in Stockton but costs between on CCT lower	Moderate cost, SR99 structure in Stockton.	High cost because of downtown construction in Stockton	High cost because of downtown construction in Stockton to get to station site.
				
Right-of-Way Issues/Cost	Structure and ROW first 6 miles in Sac. Structure in Stockton. HSR through route required in Stockton	SR99 structure in Stockton	Structure in Stockton. HSR through route required around Stockton	Structure in Stockton. HSR through route required around Stockton
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	36.42	36.11	36.88	31.55
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	0.00	0.00	0.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	37.00	18.00	16.00	19.00
Number of Wetland Crossings	13.00	26.00	26.00	29.00
Total Acreage of Wetlands Within ROW	14.56	22.17	22.17	23.48
RANKING				

















Evaluation Criteria	Alignment A1123C	Alignment A1221	Alignment A1222	Alignment A1223
Floodplain Impacts				
Number of FEMA Floodplain Crossings	8.00	5.00	4.00	7.00
Associated Length (meters) of Floodplain Crossings	18171.05	21933.19	19830.85	24662.73
Total Acreage of FEMA Floodplain Crossings	102.20	131.91	116.05	142.34
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	18.00	28.00	29.00	32.00
Count of Species along ROW	5.00	5.00	5.00	5.00
Sensitive Habitat Acreage w/in ROW	0.00	23.75	23.75	23.75
Net Sensitive Habitat Acreage along ROW	0.00	71.99	71.99	71.99
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	12902.00	27875.00	36454.00	40288.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	314.57	319.57	277.49	342.00
RANKING				

Evaluation Criteria	Alignment A1123C	Alignment A1221	Alignment A1222	Alignment A1223
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.02	36.95	36.95	36.95
Total Acreage of Parks/Recreation Areas along ROW	0.12	135.68	135.68	135.68
Incidences of Parks/Recreation Areas in ROW	1.00	4.00	4.00	4.00
Incidences of Parks/Recreation Areas along ROW	1.00	0.00	0.00	0.00
RANKING	●	○	○	○
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.1D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Sacramento to Stockton Alignment

















Evaluation Criteria	Alignment A1321	Alignment A1322	Alignment A1323	Alignment A1421A
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 15.70 minutes Mag 13.73 minutes	VHS 14.60 minutes Mag 12.71 minutes	VHS 16.73 minutes Mag 14.67 minutes	VHS 15.57 minutes Mag 13.60 minutes
				
Length	45.02 miles 72.45 km	40.97 miles 65.93 km	48.79 miles 78.52 km	44.53 miles 71.66 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Relatively inexpensive and short	Moderate cost and short	Moderate cost and short	Shorter and more costly of the two A1421 alternatives
				
Operational Issues	Freight coordination	Freight coordination. Stockton downtown. Requires HSR through track in Stockton	Freight coordination. Stockton downtown. Requires HSR through track in Stockton	Freight coordination. Stockton downtown. Requires HSR through track in Stockton
				

























Evaluation Criteria	Alignment A1321	Alignment A1322	Alignment A1323	Alignment A1421A
Construction Issues	SR99 Structure in Stockton	Structure in Stockton downtown	Structure in Stockton downtown	SR99 Structure in Stockton
				
Capital Cost	Moderate to low cost. SR99 structure in Stockton.	High cost because of downtown construction in Stockton	High cost because of downtown construction in Stockton	Moderate cost. SR99 structure in Stockton. SP row more costly to build than WP or CCT
				
Right-of-Way Issues/Cost	SR99 Structure in Stockton	Structure in Stockton. HSR through track required in Stockton	Structure in Stockton. HSR through track required in Stockton	SR99 Structure in Stockton
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	31.96	32.44	29.28	29.99
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	1.00	1.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	16.00	14.00	18.00	37.00
Number of Wetland Crossings	27.00	27.00	29.00	19.00
Total Acreage of Wetlands Within ROW	27.23	27.23	28.31	17.11
RANKING				

Evaluation Criteria	Alignment A1321	Alignment A1322	Alignment A1323	Alignment A1421A
Floodplain Impacts				
Number of FEMA Floodplain Crossings	6.00	5.00	8.00	3.00
Associated Length (meters) of Floodplain Crossings	22324.41	20222.07	25037.98	11802.49
Total Acreage of FEMA Floodplain Crossings	138.13	122.27	148.36	84.79
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	22.00	23.00	27.00	23.00
Count of Species along ROW (Adjacent Buffer-ROW)	2.00	2.00	2.00	2.00
Sensitive Habitat Acreage (ROW)	23.79	23.79	23.79	33.85
Net Sensitive Habitat Acreage (Adjacent -ROW)	72.00	72.00	72.00	95.57
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	23328.00	31907.00	47808.00	8176.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	134.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	323.15	281.07	311.36	205.08
RANKING				

Evaluation Criteria	Alignment A1321	Alignment A1322	Alignment A1323	Alignment A1421A
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	1.00
RANKING	●	●	●	◐
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	36.71	36.71	36.71	0.59
Total Acreage of Parks/Recreation Areas along ROW	116.78	116.78	116.99	3.50
Incidences of Parks/Recreation Areas in ROW	4.00	4.00	4.00	3.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	1.00	0.00
RANKING	○	○	○	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.1D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Sacramento to Stockton Alignment

















Evaluation Criteria	Alignment A1421B	Alignment A1422A	Alignment A1422B	Alignment A1423A
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 16.05 minutes Mag 14.04 minutes	VHS 14.32 minutes Mag 12.46 minutes	VHS 14.80 minutes Mag 12.90 minutes	VHS 16.45 minutes Mag 14.41 minutes
				
Length	46.29 miles 74.49 km	39.94 miles 64.27 km	41.70 miles 67.10 km	47.76 miles 76.86 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Longer and less costly of the two A1421 alternatives	Shorter and more costly of the two A1422 alternatives	Longer and less costly of the two A1422 alternatives	Shorter and more costly of the two A1423 alternatives
				
Operational Issues	SR99 structure in Stockton	Freight coordination. Stockton downtown. HSR through route required in Stockton.	Freight coordination. Stockton downtown. HSR through route required in Stockton.	Freight coordination. Stockton downtown. HSR through route required in Stockton.
				

























Evaluation Criteria	Alignment A1421B	Alignment A1422A	Alignment A1422B	Alignment A1423A
Construction Issues	SR99 structure in Stockton	Stockton downtown structure	Stockton downtown structure	Stockton downtown structure
				
Capital Cost	Moderate to low cost. SR99 structure in Stockton.	Moderate cost. Stockton downtown construction SP alignment costs higher.	Moderate to low cost. Low cost on CCT but high in downtown Stockton	Moderate to high cost. Stockton downtown construction SP alignment costs higher.
				
Right-of-Way Issues/Cost	SR99 structure in Stockton	Stockton downtown structure. HSR through track in Stockton	Stockton downtown structure. HSR through track in Stockton	SR99 structure in Stockton
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	37.65	29.75	37.86	27.15
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	1.00	0.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	35.00	35.00	33.00	39.00
Number of Wetland Crossings	9.00	19.00	9.00	21.00
Total Acreage of Wetlands Within ROW	12.32	17.79	13.01	18.88
RANKING				

















Evaluation Criteria	Alignment A1421B	Alignment A1422A	Alignment A1422B	Alignment A1423A
Floodplain Impacts				
Number of FEMA Floodplain Crossings	3.00	3.00	3.00	6.00
Associated Length (meters) of Floodplain Crossings	9289.12	9765.83	7252.46	14581.73
Total Acreage of FEMA Floodplain Crossings	68.48	69.29	52.97	95.37
RANKING	●	●	●	◐
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	14.00	22.00	13.00	26.00
Count of Species along ROW	5.00	1.00	4.00	1.00
Sensitive Habitat Acreage (ROW)	0.00	33.85	0.00	33.85
Net Sensitive Habitat Acreage (Adjacent -ROW)	0.00	95.57	0.00	95.57
RANKING	●	○	●	○
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	6251.00	8892.00	6967.00	24793.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	134.00
RANKING	●	●	●	◐
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	277.38	177.76	250.05	208.05
RANKING	◐	●	◐	●

Evaluation Criteria	Alignment A1421B	Alignment A1422A	Alignment A1422B	Alignment A1423A
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	1.00	0.00	1.00
RANKING	●	◐	●	◐
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.45	0.16	0.02	0.16
Total Acreage of Parks/Recreation Areas along ROW	2.29	1.33	0.12	1.54
Incidences of Parks/Recreation Areas in ROW	2.00	2.00	1.00	2.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	0.00	1.00
RANKING	●	●	●	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.1D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Sacramento to Stockton Alignment

Evaluation Criteria	Alignment A1423B	Alignment A1521	Alignment A1522	Alignment A1523
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 16.93 minutes Mag 14.85 minutes	VHS 15.70 minutes Mag 13.72 minutes	VHS 14.59 minutes Mag 12.71 minutes	VHS 16.72 minutes Mag 14.66 minutes
				
Length	49.52 miles 79.69 km	44.99 miles 72.40 km	40.94 miles 65.89 km	48.76 miles 78.47 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Longer and less costly of the two A1423 alternatives	Relatively inexpensive and short	Moderate cost and short	Moderate cost and short
				
Operational Issues	Freight coordination. Stockton downtown. HSR through route required in Stockton.	SR99 structure in Stockton Sacramento connection very convoluted	Freight coordination. Stockton downtown. HSR through route required in Stockton. Sacramento connection very convoluted	Freight coordination. Stockton downtown. HSR through route required in Stockton. Sacramento connection very convoluted
				

Evaluation Criteria	Alignment A1423B	Alignment A1521	Alignment A1522	Alignment A1523
Construction Issues	Stockton downtown structure	SR99 structure in Stockton American River Bridge in Sacramento	Stockton downtown structure American River Bridge in Sacramento	Stockton downtown structure American River Bridge in Sacramento
				
Capital Cost	Moderate cost. Stockton downtown construction CCT alignment costs lower but longer.	Moderate costs. SR99 structure in Stockton	Moderate to high costs. Stockton downtown structure American River Bridge in Sacramento	Moderate to high costs. Stockton downtown structure American River Bridge in Sacramento
				
Right-of-Way Issues/Cost	Stockton downtown structure. HSR through route in Stockton.	SR99 structure in Stockton	Stockton downtown structure. HSR through route in Stockton.	Stockton downtown structure. HSR through route in Stockton.
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	33.96	37.95	38.83	34.84
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	1.00	1.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	37.00	16.00	14.00	18.00
Number of Wetland Crossings	11.00	27.00	27.00	29.00
Total Acreage of Wetlands Within ROW	14.10	27.23	27.23	28.31
RANKING				

Evaluation Criteria	Alignment A1423B	Alignment A1521	Alignment A1522	Alignment A1523
Floodplain Impacts				
Number of FEMA Floodplain Crossings	6.00	6.00	5.00	8.00
Associated Length (meters) of Floodplain Crossings	12068.37	26463.39	24361.05	29176.96
Total Acreage of FEMA Floodplain Crossings	79.06	153.74	137.88	163.97
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	17.00	26.00	27.00	31.00
Count of Species along ROW (Adjacent Buffer-ROW)	4.00	2.00	2.00	2.00
Sensitive Habitat Acreage (ROW)	0.00	23.79	23.79	23.79
Net Sensitive Habitat Acreage (Adjacent -ROW)	0.00	72.00	72.00	72.00
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	22868.00	27758.00	36337.00	52238.00
Low Income Within 1,400' Buffer – 1990 Households	134.00	187.00	187.00	321.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	280.35	323.15	281.07	311.36
RANKING				

Evaluation Criteria	Alignment A1423B	Alignment A1521	Alignment A1522	Alignment A1523
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	1.00	1.00	1.00
RANKING	●	◐	◑	◒
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.02	36.71	36.71	36.71
Total Acreage of Parks/Recreation Areas along ROW	0.33	116.78	116.78	116.99
Incidences of Parks/Recreation Areas in ROW	1.00	4.00	4.00	4.00
Incidences of Parks/Recreation Areas along ROW	1.00	0.00	0.00	1.00
RANKING	●	○	○	○
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				



Least Favorable

Most Favorable

4.1.2 Stockton to Modesto Segment

This segment operates from station sites in Stockton to the next station city of Modesto. In the Stockton area, three station sites have been evaluated. The alignments considered are grouped into one high-speed rail corridor, along the northeastern quadrant of Stockton that can split into two general routes, either a West of 99 new alignment or a BNSF railroad alignment. Station track variants allow for connections to five station sites in Modesto.

A. THE STOCKTON STATION SITES ARE:

S21 Stockton Farmington Road

The Farmington Road site is located between the BNSF railroad right-of-way and State Route 4, Farmington Road, just east of Highway 99. The site has been considered for a consolidated Amtrak station for Stockton. The high-speed train system would reach the site on a new station stopping alignment from the Western Pacific or Southern Pacific routes from Sacramento.

S22 Stockton ACE Downtown

The Downtown station site is the former Southern Pacific depot and the current terminal of the Altamont Railway Express (ACE) commuter service to San Jose. It is located near the corner of North Aurora and East Weber Streets at the crossing of the Southern Pacific Fresno line. The high-speed train system would reach this station on an upgraded existing alignment of the combined Western Pacific and Southern Pacific routes or a new station stopping alignment from the Central California Traction.

S23 Stockton Airport

The Stockton Airport site is located at the present Municipal Airport on South Airport Way. The exact location and orientation of the station would depend on aviation requirements. The site would be served by a new station stopping alignment that would diverge from an upgraded Southern Pacific alignment south of downtown Stockton.

B. THE STOCKTON ALIGNMENT GROUPINGS ARE:

Leaving Stockton, two high-speed through alignments are possible after stopping track alignments return to the main lines. The two high-speed through routes diverge from the single northeastern/eastern high-speed route from Sacramento. One continues along the existing BNSF rail corridor, the other moves to a new W99 alignment as it approaches Modesto. The BNSF high-speed alignment consists of line segments 202, 207, 208 and 210. The W99 high-speed alignment follows line segments 202, 209 and 211.

Stopping tracks from Station 21, Stockton Farmington Road can reach the BNSF alignment only, using line segment 206.

Stopping tracks from Station 22, Stockton ACE Downtown, can be connected to either high-speed route. It connects to the BNSF via line segments 201, 204 and 205, and to the W99 via line segments 201 and 203.

Stopping tracks from Station 23, Stockton Airport can reach the BNSF alignment only, using new alignment segment 205.

The high-speed BNSF rail route approaches Modesto on the east via line segment 210 and 213. A continuing high-speed through route bows off from the existing rail route via line segments 221 and 219 and rejoins the BNSF corridor via line segment 307.

An East of 99 alignment, serving Station 35, Modesto East as a standard intermediate station, would comprise line segments 213, 216 and 306.

Stopping tracks reach Station 31, Modesto Amtrak Briggsmore, via line segment 215, and Station 32, Modesto Empire, via line segments 215 and 220.

A West of 99 high-speed through route is comprised of line segments 209 and 211 and continues on toward Merced on line segments 301 and 308. This route would serve Station 34, Modesto West, in a standard intermediate station configuration.

Station 33, Modesto SP Downtown, would be reached from the W99 alignment via stopping tracks using line segment 212. This station could access high-speed alignments either on the W99 corridor via stopping track line segment 302 or on the SP corridor via stopping track line segment 303. The southern portion of line segment 303 can be upgraded to high speed status once past the limitations of central Modesto.

In summary, while two prospective high-speed through routes approach Modesto from the north, all four general alignments could serve as high-speed through routes from the Modesto to the south. However, not all stations can be served in all combinations of the through alignments. Stations 31 and 32 and 35 only connect to the eastern alignments (BNSF and E99), Stations 34 and 33 only connect to the western alignments, (SP and W99). This is first time that station choice constrains further alignment choices south, or conversely, the choice of an alignment in the Modesto to Merced segment would limit station choices in Modesto.

Stockton Stations Track Alignments

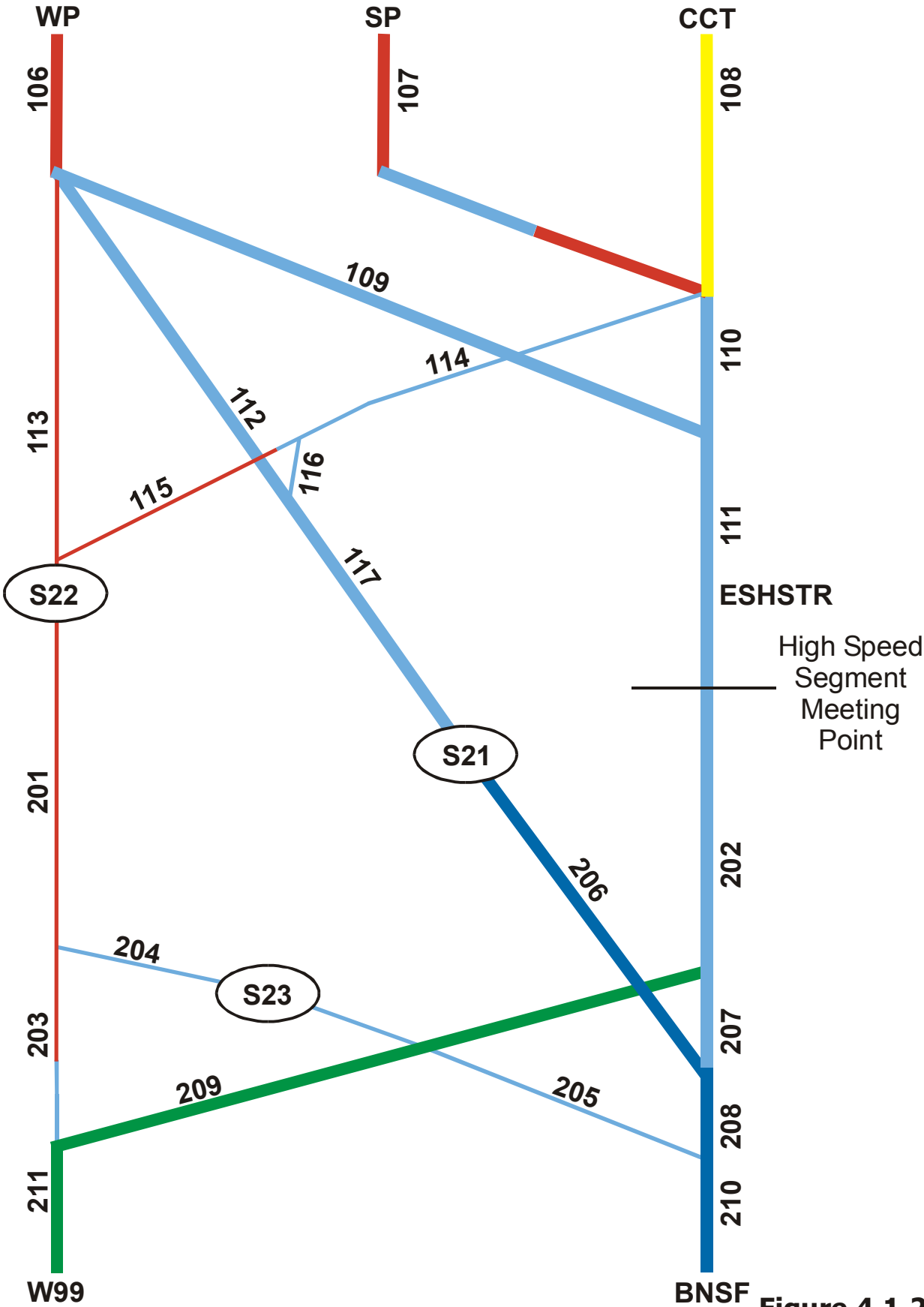


Figure 4.1.2B

Segment 2
Stockton to Modesto
Station to Station Alignments

Alignment #	Stations	Line Segments	Associated Through Line Segments
A2131	S21 Stockton Farmington Road to S31 Modesto Amtrak Briggsmore	206, 208, 210, 213, 215	202, 207, 214
A2132	S21 Stockton Farmington Road to S32 Modesto Empire	206, 208, 210, 213, 215, 220	202, 207, 214
A2133	S21 Stockton Farmington Road to S33 Modesto SP Downtown	Not Applicable	
A2134	S21 Stockton Farmington Road to S34 Modesto West	Not Applicable	
A2135	S21 Stockton Farmington Road to S35 Modesto East	206, 208, 210, 214, 217, 222	202, 207
A2231	S22 Stockton ACE Downtown to S31 Modesto Amtrak Briggsmore	201, 204, 205, 210, 213, 215	202, 207, 214
A2232	S22 Stockton ACE Downtown to S32 Modesto Empire	201, 204, 205, 210, 213, 215, 220	202, 207, 214
A2233	S22 Stockton ACE Downtown to S33 Modesto SP Downtown	201, 203, 212	202, 209, 211
A2234	S22 Stockton ACE Downtown to S34 Modesto West	201, 203, 211	202, 209
A2235	S22 Stockton ACE Downtown to S35 Modesto East	201, 204, 205, 210, 214, 217, 222	202, 207
A2331	S23 Stockton Airport to S31 Modesto Amtrak Briggsmore	205, 210, 213, 215	202, 207, 214
A2332	S23 Stockton Airport to S32 Modesto Empire	205, 210, 213, 215, 220	202, 207, 214
A2333	S23 Stockton Airport to S33 Modesto SP Downtown	Not Applicable	
A2334	S23 Stockton Airport to S34 Modesto West	Not Applicable	
A2335	S23 Stockton Airport to S35 Modesto East	205, 210, 214, 217, 222	202, 207

C. STATION SCREENING CONSIDERATIONS

S21 Stockton Farmington Road

Planning: The S21 Farmington Road station site can be adjacent to and connected with a proposed new Amtrak station in the same area. The site is south and east of downtown Stockton, whose recent growth has been to the north and west along I-5. The station site can connect to the existing BNSF rail route or to a conceptual E99 route.

Engineering: The station can be located on a high-speed through route or on a stopping track alignment near a through route somewhat to the east. The through route option requires structure for four tracks to follow the SR99 Freeway north of the site. The stopping track arrangement reduces the structural footprint to two tracks while adding a two-track through route to the east, which could be an advantage in the constrained area near the SR 99 Freeway.

Cost: Locating a standard configuration station in a relatively open area would incur moderate costs for the station.

Environmental: This station site would cross natural streams and wetlands twice, affect one endangered/threatened species, and occupy a small portion of the 100-year floodplain. 55% of the site is located on prime, unique, or important farmland. However, only 18% of the site is occupied by incompatible land uses. There are no known environmental justice considerations, public park impacts, or nationally registered historic site impacts.

S22 Stockton ACE Downtown

Planning: The S22 ACE Downtown site would provide center city access and connectivity with ACE trains through the Altamont Pass to the lower East Bay region. The City of Stockton has land assembly powers and has reserved several blocks in the vicinity of this station site as a redevelopment district.

Engineering: The S22 ACE Downtown site poses technical challenges. The location is just north of the at-grade crossing of both the BNSF and UP mainlines in the Central Valley. A highway structure also carries the SR 4 Freeway over the alignment. The highway impedes taking the HSR line over the railroads in an aerial configuration. Due to the proximity of the Port of Stockton and the Calaveras River, the high water table in the area makes trenching impractical. Additional pumping measures would likely be necessary.

Cost: The engineering challenges of the site would make a station here quite costly.

Environmental: This site does not exhibit significant environmental impacts, but would pose environmental justice and cultural resource concerns. In particular, it affects a significant number of minorities and low-income households, as well as a public park and two nationally registered historic sites. 55% of the area is occupied by land uses considered to be incompatible and visually sensitive to a HSR station. However, this site impacts no wetlands, natural streams, floodplains, sensitive wildlife habitat, or farmlands.

S23 Stockton Airport







Planning: The S23 Stockton Airport site is large, flat and well suited to an HSR station in conjunction with the commercial airport functions at the site. The site is located some distance south of the developed areas of Stockton and can be reached by local streets.













Engineering: The site would require a new rail alignment on both sides of the station. The rail line north of the station would encounter the same technical locational challenges as the downtown station site.













Cost: The stopping track station on a relatively open site suggests moderate station costs for this option.

Environmental: The Airport site would not affect any wetlands, sensitive wildlife habitat, nationally registered historic sites, or public parks and recreation areas. However, it does affect a significant number of minorities and one natural stream, as well as occupy land that consists almost entirely of prime, unique, or important farmland.




Table 4.1.2C
Sacramento to Bakersfield - High-Speed Train Station Alignment Evaluation Matrix
Stockton Stations

Evaluation Criteria	Station S21 Stockton Farmington Road	Station S22 Stockton ACE Downtown	Station S23 Stockton Airport	
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable	Not Applicable	Not Applicable	
Length	Not Applicable	Not Applicable	Not Applicable	
Population/Employment Catchment				
				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	<ul style="list-style-type: none"> • Outlying location. • Freeway access: ¼ mile from 99 Fwy on SR 4 • Street access: Distant from Stockton proper. • Parking: unconstrained • Transit: No service at present • Other rail: Amtrak considering a consolidated Stockton station at site; if built, a good transfer station for East Bay destinations via San Joaquins 	<ul style="list-style-type: none"> • Downtown location. • Freeway access: SR 4 Crosstown freeway, then to I-5 and 99 Fwy, via city streets. • Street access: on central city street grid. • Parking: ample land opportunity in vicinity • Transit: On city bus routes • Other rail: shares site with ACE commuter rail station, present Amtrak San Joaquins to Sacramento 	<ul style="list-style-type: none"> • Outlying location. • Freeway access: Distant via county road. • Street access: Distant from central Stockton, access via Airport Way. • Parking: unconstrained, shared with airport • Transit: Airport bus to city. • Other rail: • Airport: connects to limited commercial flights • Airport ground facilities: rental car agencies 	
				
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable	Not Applicable	Not Applicable	

Evaluation Criteria	Station S21 Stockton Farmington Road	Station S22 Stockton ACE Downtown	Station S23 Stockton Airport	
Operational Issues	<ul style="list-style-type: none"> On stopping track alignment Railroad interaction: along BNSF r-o-w, normal coordination 	<ul style="list-style-type: none"> On stopping track alignment Railroad interaction: just north of level crossing of BNSF and UP main lines in Valley. Coordination with ACE terminal operations at station site. 	<ul style="list-style-type: none"> On stopping track alignment Railroad interaction: just south of level crossing of BNSF and UP mainlines in Valley. Airport interaction: location must be coordinated to avoid clear zones of airport. 	
				
Construction Issues	<ul style="list-style-type: none"> Relatively straightforward, open-field construction at station. Approach track must cross 99 Fwy on long structure. 	<ul style="list-style-type: none"> Must be elevated or depressed through most of city, especially downtown, to coexist with street grid and with congested freight railroads to the south of site. Aerial alignment must contend with 4 Fwy, trench alignment must contend with water table issues. 	<ul style="list-style-type: none"> Station relatively straightforward, except for aviation constraints. Station stopping track uses same alignment as downtown station, must resolve all same issues. 	
				
Capital Cost	Moderate.	High, due to central urban location and rail interaction issues.	Moderate at station site. Approach alignments more challenging.	
				
Right-of-Way Issues/Cost	Follows BNSF r-o-w.	City may use redevelopment powers to enhance land assembly and cost.	All new r-o-w to reach site.	
				

Evaluation Criteria	Station S21 Stockton Farmington Road	Station S22 Stockton ACE Downtown	Station S23 Stockton Airport	
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	17.98	54.61	16.18	
Primary Land Uses (acreage) within station area	Farmland/Agriculture (158); Industrial (255); Residential (90)	Commercial (107); Industrial (72); Institutional (104); Mixed Use (50); Residential (148)	Farmland/Agriculture (422); Institutional (81)	
Rank				
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	17.98	54.61	16.18	
Number of scenic corridor and scenic river crossings	0	0	0	
Rank				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	2	0	1	
Number of Wetland Crossings	2	0	0	
Total Acreage of Wetlands within Station Area	1.03	0	0	
Rank				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	4	0	2	
Total Acreage of FEMA Floodplain Crossings within Station Area	6.81	0	289.85	
Rank				

Evaluation Criteria	Station S21 Stockton Farmington Road	Station S22 Stockton ACE Downtown	Station S23 Stockton Airport	
Threatened & Endangered Species Impacts				
Count of Species	1	0	0	
Acreage of Sensitive Habitat within Station Area	0	0	0	
Rank				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	0	7172	2036	
Low Income Within 1,400' Buffer – 1990 Households	0	134	0	
Rank				
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	277.51	0	503.02	
Rank				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0	2	0	
Rank				

Evaluation Criteria	Station S21 Stockton Farmington Road	Station S22 Stockton ACE Downtown	Station S23 Stockton Airport	
Parks & Recreation/Wildlife Refuge Impacts				
Count of Parks/Recreation Areas	0	1	0	
Total Acreage Parks/Recreation Areas in Station Area	0	2.96	0	
Rank				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				







Least Favorable Most Favorable

D. ALIGNMENT SCREENING CONSIDERATIONS

The eastern through route alignment from the Stockton area consists of a new high-speed routing to meet the BNSF mainline route. No major engineering problems would be anticipated.

The alignment leaving the S22 Stockton Downtown station and approaching the S23 Stockton Airport station presents significant engineering challenges. The stopping tracks must cross the junction of the BNSF and UP lines on separate grade south of downtown. Aerial structure must contend with the SR 4 Freeway above and trench construction must deal with the high water table in the area, as well as the Calaveras River crossing just north of the S22 station site.

Once past the airport station site, new alignments bring the station track alignment to either the BNSF alignment or the W99 alignment for high-speed running. The BNSF is the shortest alignment to the Modesto area and is relatively undeveloped. Some coordination with the BNSF will be required but additional right-of-way is available at moderate cost. The W99 alignment is all new and would encounter equally low development constraints along the route, thus predicting moderate costs as well. If the W99 alignment were located with a view toward complete high-speed running through the segment, it would not serve any of the three investigated station sites.

Overview of Environmental Impacts on the 11 Alignment Variations

Eleven Alignment Variations between Stockton and Modesto were analyzed using the same nine environmental evaluation criteria.

None of the alignments in this segment exhibited uniformly low impacts. The two alignments exhibiting the fewest overall impacts are:

- A2331, running from Stockton Airport to Modesto Amtrak Briggsmore, and
- A2235, running from Stockton Airport to Modesto East.

They were rated to be in the lowest impact categories for floodplains, threatened and endangered species, environmental justice, farmland, and cultural resource impacts. However, A2331 exhibits intermediate levels of impact for land use, visual, and water resources and higher impacts on parks and recreation. A2335 has intermediate to low impacts on land use compatibility and parks and recreation, but had high impact levels on visual and water resources impacts.

Two other alignments had somewhat more impacts. These are:

- A2131 Stockton Farmington Road to Modesto Amtrak Briggsmore, and
- A2135 Stockton Farmington Road to Modesto East.

These two alignments exhibited the same or nearly the same level of impacts as the first two alignments for floodplains, environmental justice, and cultural resources; had somewhat fewer impacts on land use; and had somewhat greater impacts on water resources, threatened and endangered species, farmland, and parks and recreation. A2135 had the greatest impact on farmland of these four alignments

















Depending on the relative values placed on the nine environmental criteria, these four alignments could be considered to be overall at about the same level of impact. However, individual resource impacts vary between the alignments.

























Three alignments exhibiting the greatest level of impacts are:

















- A2231 Stockton ACE Downtown to Modesto Amtrak Briggsmore,
- A2232 Stockton ACE Downtown to Modesto Empire, and
- A2235 Stockton Ace Downtown to Modesto East

With the exception of impacts on visual and cultural resources, these three alignments had greater impacts in all categories when compared to the four alignments noted above. The greatest difference between these three alignments and the four alignments noted is in impacts on floodplains, environmental justice, and parks and recreation.

Table 4.1.2D
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Stockton to Modesto Alignment

Evaluation Criteria	Alignment A2131	Alignment A2132	Alignment A2135	Alignment A2231
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 10.10 minutes Mag 9.49 minutes	VHS 10.58 minutes Mag 10.07 minutes	VHS 10.98 minutes Mag 10.47 minutes	VHS 11.58 minutes Mag 11.06 minutes
				
Length	25.674 miles 41.319 km	27.773 miles 44.696 km	29.236 miles 47.050 km	31.424 miles 50.571 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Relatively direct route	Relatively direct route	Relatively direct route	Not as direct as A2131
				
Operational Issues	BNSF alignment; normal coordination issues Amtrak coordination	BNSF alignment; normal coordination issues Amtrak coordination	Diverges from BNSF alignment	Diverges from UP and ACE alignment, travels on new alignment, merges with BNSF alignment
				

Evaluation Criteria	Alignment A2131	Alignment A2132	Alignment A2135	Alignment A2231
Construction Issues	Stanislaus River crossing and other watershed crossings	Stanislaus River crossing and other watershed crossings	Shares alignment with BNSF, then new alignment for last 7 miles	Downtown location and grade separations, esp. rail crossings south of station S22. Water table in Delta floodplain. New urban ROW.
				
Capital Cost	Moderate cost	Moderate cost	Moderate cost	Moderate to high cost because of Stockton Downtown costs.
				
Right-of-Way Issues/Cost	Excess railroad r-o-w and/or adjacent agricultural or industrial land.	Excess railroad r-o-w and/or adjacent agricultural or industrial land.	BNSF upgrade New alignment	New urban alignment New alignment BNSF upgrade
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	3.69	6.00	3.19	9.25
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	3.00	4.00	4.00	3.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	10.00	11.00	11.00	10.00
Number of Wetland Crossings	1.00	2.00	1.00	3.00
Total Acreage of Wetlands Within ROW	2.52	3.22	0.72	3.61
RANKING				

Evaluation Criteria	Alignment A2131	Alignment A2132	Alignment A2135	Alignment A2231
Floodplain Impacts				
Number of FEMA Floodplain Crossings	4.00	5.00	6.00	9.00
Associated Length (meters) of Floodplain Crossings	920.19	1040.04	1493.19	6741.69
Total Acreage of FEMA Floodplain Crossings	10.60	11.50	15.08	43.97
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	4.00	4.00	3.00	6.00
Count of Species along ROW	0.00	0.00	3.00	6.00
Sensitive Habitat Acreage w/in ROW	0.00	0.00	0.00	0.00
Net Sensitive Habitat Acreage along ROW	0.00	0.00	0.00	0.00
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	6564.00	6564.00	4032.00	20449.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	134.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	210.44	221.91	258.08	219.51
RANKING				













































Evaluation Criteria	Alignment A2131	Alignment A2132	Alignment A2135	Alignment A2231
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.00	0.00	0.00
Total Acreage of Parks/Recreation Areas along ROW	1.91	1.91	1.61	2.12
Incidences of Parks/Recreation Areas in ROW	0.00	0.00	0.00	0.00
Incidences of Parks/Recreation Areas along ROW	2.00	2.00	1.00	3.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.2D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Stockton to Modesto Alignment

Evaluation Criteria	Alignment A2232	Alignment A2233	Alignment A2234	Alignment A2235
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 12.15 minutes Mag 11.63 minutes	VHS 11.37 minutes Mag 10.85 minutes	VHS 10.45 minutes Mag 9.93 minutes	VHS 12.55 minutes Mag 12.03 minutes
Length	33.522 miles 53.949 km	30.653 49.331 km	27.287 miles 43.914 km	34.985 miles 56.303 km
Population/Employment Catchment				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections				
<i>Minimize Operating and Capital Costs.</i>				
Length	Not as direct as A2132	Route meanders	Relatively straight	Route meanders
Operational Issues	Diverges from UP and ACE alignment, travels on new alignment, merges with BNSF alignment	Same as A2232, but more UP and ACE interaction for 10 miles	Same as A2232, but more UP and ACE interaction for 10 miles	Diverges from UP and ACE alignment, travels on new alignment, merges with BNSF alignment













Evaluation Criteria	Alignment A2232	Alignment A2233	Alignment A2234	Alignment A2235
Construction Issues	Downtown location and grade separations, especially rail crossings south of station S22. Water table issues in floodplain of Delta. New urban right-of-way first 10 miles	Downtown location and grade separations, especially rail crossings south of station S22. Water table issues in floodplain of Delta. New urban right-of-way first 10 miles	Downtown location and grade separations, especially rail crossings south of station S22. Water table issues in floodplain of Delta. New urban right-of-way first 10 miles, then farmland	Downtown location and grade separations, especially rail crossings south of station S22. Water table issues in floodplain of Delta. New urban right-of-way first 10 miles
				
Capital Cost	Moderate cost. Downtown costs in Stockton	Moderate cost. Downtown costs in Stockton	Moderate cost. Downtown costs in Stockton	Moderate cost. Downtown costs in Stockton
				
Right-of-Way Issues/Cost	New urban alignment New alignment BNSF upgrade	New urban alignment New alignment	New urban alignment New alignment	New urban alignment New alignment BNSF upgrade
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	10.79	13.31	14.89	8.33
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	4.00	3.00	3.00	4.00
RANKING				
















Evaluation Criteria	Alignment A2232	Alignment A2233	Alignment A2234	Alignment A2235
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	11.00	5.00	5.00	11.00
Number of Wetland Crossings	4.00	2.00	3.00	3.00
Total Acreage of Wetlands Within ROW	4.31	0.37	0.57	1.81
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	10.00	3.00	3.00	11.00
Associated Length (meters) of Floodplain Crossings	6861.54	1002.95	1002.95	7314.69
Total Acreage of FEMA Floodplain Crossings	44.88	7.04	7.04	48.45
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	6.00	5.00	4.00	5.00
Count of Species along ROW	6.00	7.00	2.00	0.00
Sensitive Habitat Acreage w/in ROW	0.00	2.00	0.00	0.00
Net Sensitive Habitat Acreage along ROW	0.00	0.00		
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	20449.00	19138.00	17890.00	17917.00
Low Income Within 1,400' Buffer – 1990 Households	134.00	196.00	134.00	134.00
RANKING				













Evaluation Criteria	Alignment A2232	Alignment A2233	Alignment A2234	Alignment A2235
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	230.98	204.29	195.12	267.16
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.00	0.00	0.00
Total Acreage of Parks/Recreation Areas along ROW	2.12	0.21	0.21	1.82
Incidences of Parks/Recreation Areas in ROW	0.00	0.00	0.00	0.00
Incidences of Parks/Recreation Areas along ROW	3.00	1.00	1.00	2.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				










Evaluation Criteria	Alignment A2232	Alignment A2233	Alignment A2234	Alignment A2235
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.2D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Stockton to Modesto Alignment

Evaluation Criteria	Alignment A2331	Alignment A2332	Alignment A2335	
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 9.55 minutes Mag 9.04 minutes	VHS 10.13 minutes Mag 9.61 minutes	VHS 10.53 minutes 10.01 minutes	
				
Length	24.005 miles 38.632 km	26.103 miles 42.009 km	27.566 miles 44.363 km	
				
Population/Employment Catchment				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections				
<i>Minimize Operating and Capital Costs.</i>				
Length	Meanders somewhat	Meanders somewhat	Meanders somewhat	
				
Operational Issues	Diverges from UP and ACE alignment, travels on new alignment, merges with BNSF alignment. Presupposes downtown routing from north	Diverges from UP and ACE alignment, travels on new alignment, merges with BNSF alignment. Presupposes downtown routing from north	Diverges from UP and ACE alignment, travels on new alignment, merges with BNSF alignment. Presupposes downtown routing from north	
				

Evaluation Criteria	Alignment A2331	Alignment A2332	Alignment A2335	
Construction Issues	Presupposes downtown routing in line segments 201 and 204 with grade separations, especially rail crossings north of station S23. Water table issues in floodplain of Delta. New urban right-of-way first 7 miles	Presupposes downtown routing in line segments 201 and 204 with grade separations, especially rail crossings north of station S23. Water table issues in floodplain of Delta. New urban right-of-way first 7 miles	Presupposes downtown routing in line segments 201 and 204 with grade separations, especially rail crossings north of station S23. Water table issues in floodplain of Delta. New urban right-of-way first 7 miles New right-of-way in open land	
				
Capital Cost	Moderate to low cost as starts south of Stockton	Moderate to low cost as starts south of Stockton	Moderate to low cost as starts south of Stockton	
				
Right-of-Way Issues/Cost	New urban alignment New alignment BNSF upgrade	New urban alignment New alignment BNSF upgrade	New urban alignment New alignment BNSF upgrade	
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	7.68	9.82	6.67	
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	3.00	4.00	6.00	
RANKING				

Evaluation Criteria	Alignment A2331	Alignment A2332	Alignment A2335	
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	6.00	7.00	7.00	
Number of Wetland Crossings	1.00	2.00	4.00	
Total Acreage of Wetlands Within ROW	2.52	3.22	4.03	
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	6.00	7.00	4.00	
Associated Length (meters) of Floodplain Crossings	1925.78	2045.63	1817.56	
Total Acreage of FEMA Floodplain Crossings	17.89	18.79	13.52	
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	2.00	2.00	0.00	
Count of Species along ROW	0.00	0.00	0.00	
Sensitive Habitat Acreage w/in ROW	0.00	0.00	0.00	
Net Sensitive Habitat Acreage along ROW			0.00	
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	4548.00	4548.00	4548.00	
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	
RANKING				

Evaluation Criteria	Alignment A2331	Alignment A2332	Alignment A2335	
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	189.21	200.68	140.35	
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	
Number of National Register Resources along ROW	0.00	0.00	0.00	
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.00	0.00	
Total Acreage of Parks/Recreation Areas along ROW	1.91	1.91	0.30	
Incidences of Parks/Recreation Areas in ROW	0.00	0.00	0.00	
Incidences of Parks/Recreation Areas along ROW	2.00	2.00	1.00	
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				

Evaluation Criteria	Alignment A2331	Alignment A2332	Alignment A2335	
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				



Least Favorable



Most Favorable

4.1.3 Modesto to Merced Segment

This segment operates from station sites in Modesto to the next station city of Merced. In the Modesto area, five station sites have been evaluated. The stations are aligned in two groups, determined by their location on the approaches along the BNSF alignment on the northern and eastern side of the city or along the W99 alignment along the western and southern side. Each group has two high-speed outlets south of the city and station stopping track variants allow for connections to station sites within each group.

A. THE MODESTO STATION SITES ARE:

S31 Modesto Amtrak Briggsmore

The Modesto Amtrak station is a new structure on the northeast side of the city on Held Drive north of Briggsmore Avenue. The High-Speed Rail station would be built along the same BNSF alignment. Actual architectural and engineering designs could integrate the two rail passenger services, providing an integrated transfer station.

S32 Modesto Empire

The Modesto Empire station would occupy portions of a BNSF rail yard site in the Empire section of Modesto. The site is south of Yosemite Boulevard (SR 132) and west of Santa Fe Avenue. This was the site of the Santa Fe station for Modesto decades ago.

S33 Modesto SP Downtown

The Modesto SP Downtown site is the former Southern Pacific rail station and current Modesto Transportation Center. It is located on Ninth Street between I and J Streets.

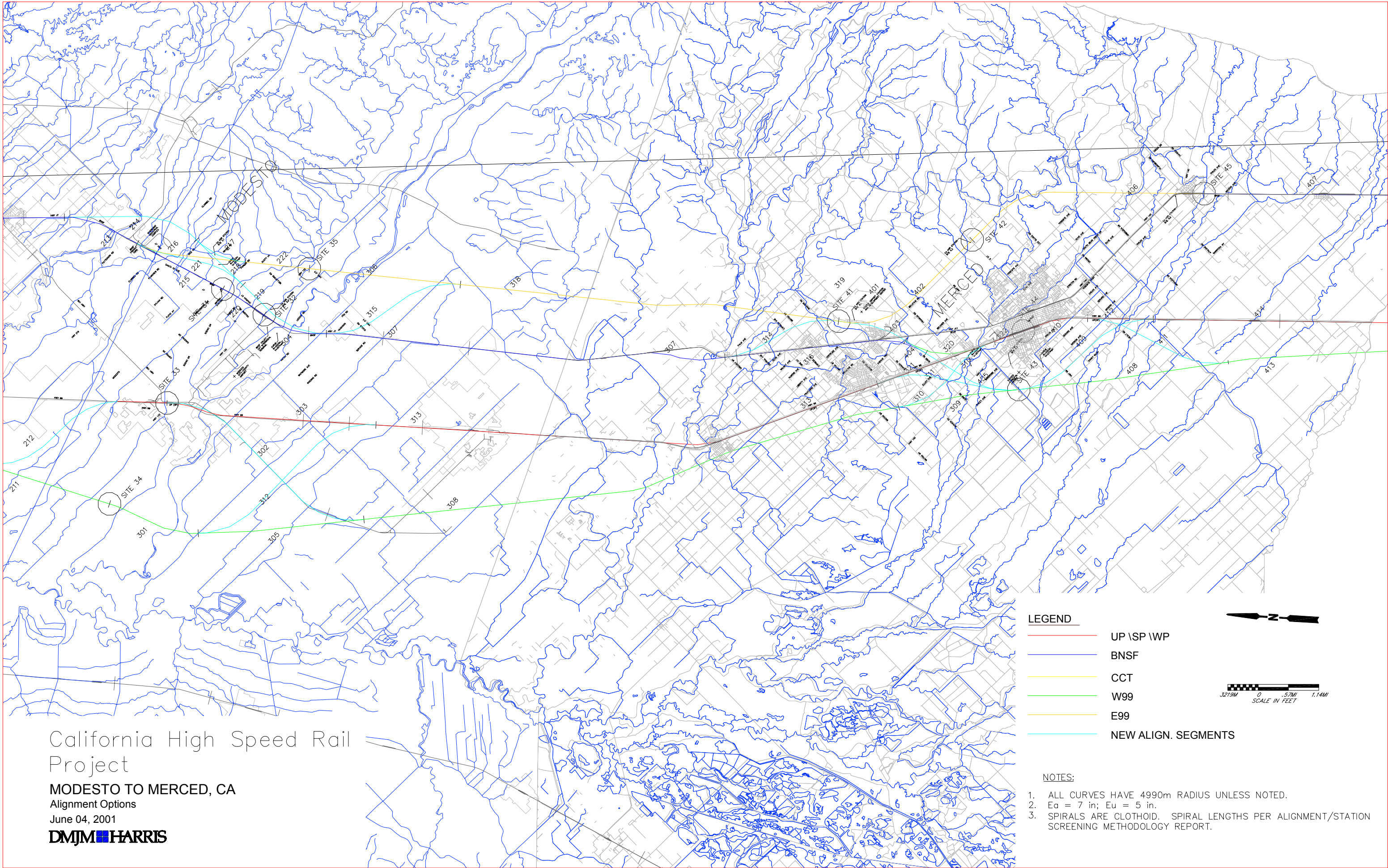
S34 Modesto West

The Modesto West Side station would be located at an outlying site along Maze Boulevard (SR 132), where the West of 99 alignment crosses the highway. It would be built in the standard intermediate station configuration on a high-speed line.

S35 Modesto East

The Modesto East Side station would be located at an outlying site along Yosemite Boulevard (SR 132), where the East of 99 alignment crosses the highway. It would be built in the standard intermediate station configuration on a high-speed line.

Leaving Modesto, four discrete alignments lead toward Merced along the four basic alignment options (W99, SP, BNSF, E99). All may be high-speed through tracks, once stopping track alignments from Stations 31, 32, and 33 have rejoined the main lines. Only Station 34, Modesto West and Station 35, Modesto East, would be built in the standard intermediate station configuration on high-speed lines.



California High Speed Rail Project

MODESTO TO MERCED, CA
Alignment Options
June 04, 2001



LEGEND

- UP \ SP \ WP
- BNSF
- CCT
- W99
- E99
- NEW ALIGN. SEGMENTS

NOTES:

- ALL CURVES HAVE 4990m RADIUS UNLESS NOTED.
- Ea = 7 in; Eu = 5 in.
- SPIRALS ARE CLOTHOID. SPIRAL LENGTHS PER ALIGNMENT/STATION SCREENING METHODOLOGY REPORT.

B. THE MODESTO ALIGNMENT GROUPINGS ARE:

Leaving Modesto, all four major alignments, that is, the W99, SP, BNSF and E99 are available for further travel south toward Merced. However, not every alignment is available for each station site considered in Modesto. Stations 31 Modesto Amtrak Briggsmore and S32 Modesto Empire only feed out to either the BNSF or E99 route. Stations S33 Modesto SP Downtown and S34 Modesto West only feed out to either the W99 or SP route. All lines become high-speed alignments south of the city.

Stopping tracks from Station S31 Modesto Amtrak Briggsmore and Station S32 Modesto Empire use Line Segments 220 and 304 to reach high-speed track on the BNSF route at Line Segment 307. Stopping tracks from these stations also include Line Segment 315 to reach the E99 route at high-speed Line Segment 318. Station S35 Modesto East is located on a high-speed through route at all times using Line Segments 306 and 318. This constitutes the eastern group of stations and alignments. It may also be possible to use the east side stations in a standard high-speed four-track configuration.

Similarly on the western side of the city, stopping tracks from Station S33 Modesto SP Downtown use Line Segment 303 to reach high-speed track on the SP route at Line Segment 313. Stopping tracks from the same station use Line Segment 302 to reach high-speed track on the W99 route at Line Segment 308. Station S34 Modesto West is located on a high-speed through route at all times using Line Segments 301 and 308. This constitutes the western group of stations and alignments.

Modesto Stations Track Alignments

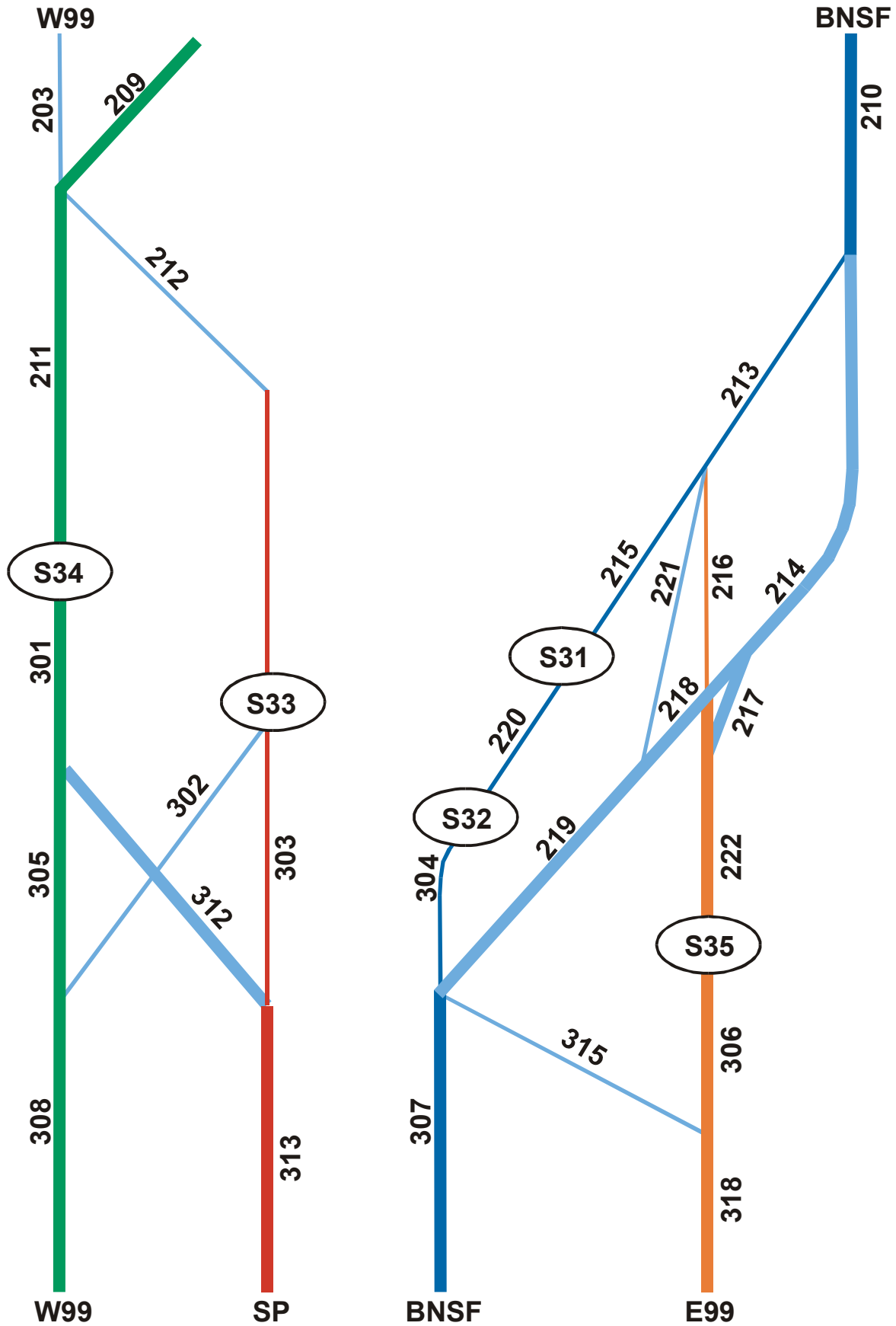


Figure 4.1.3B

Table 4.1.3B

**Segment 3
Modesto to Merced
Station to Station Alignments**

Alignment #	Stations	Line Segments	Associated Through Line Segments
A3141A	S31 Modesto Amtrak Briggsmore to S41 Merced Castle via BN	220, 304, 307, 314	218, 219
A3141B	S31 Modesto Amtrak Briggsmore to S41 Merced Castle via E99	220, 304, 315, 318	217, 222, 306
A3142A	S31 Modesto Amtrak Briggsmore to S42 Merced University via BN	220, 304, 307, 314, 402	218, 219
A3142B	S31 Modesto Amtrak Briggsmore to S42 Merced University via 399	220, 304, 315, 318, 402	217, 222, 306
A3143A	S31 Modesto Amtrak Briggsmore to S43 Merced Municipal Airport via BN	220, 304, 307, 316, 404, 405	218, 219
A3143B	S31 Modesto Amtrak Briggsmore to S43 Merced Municipal Airport via E99	220, 304, 315, 318, 403, 404, 405	217, 222, 306
A3144A	S31 Modesto Amtrak Briggsmore to S44 Merced SP Downtown via BN	220, 304, 307, 316, 404, 320, 322	218, 219, 405
A3144B	S31 Modesto Amtrak Briggsmore to S44 Merced SP Downtown via E99	220, 304, 315, 318, 403, 404, 320, 322	217, 222, 306, 405
A3145A	S31 Modesto Amtrak Briggsmore to S45 Merced Plainsburg via BN	220, 304, 307, 314, 402, 406	218, 219
A3145B	S31 Modesto Amtrak Briggsmore to S45 Merced Plainsburg via E99	220, 304, 315, 318, 402, 406	217, 222, 306
A3241A	S32 Modesto Empire to S41 Merced Castle via BN	304, 307, 314	218, 219
A3241B	S32 Modesto Empire to S41 Merced Castle via E99	304, 315, 318	217, 222, 306
A3242A	S32 Modesto Empire to S42 Merced University via BN	304, 307, 314, 402	218, 219
A3242B	S32 Modesto Empire to S42 Merced University via E99	304, 315, 318, 402	217, 222, 306
A3243A	S43 Modesto Empire to S43 Merced Municipal Airport via BN	304, 307, 316, 404, 405	218, 219
A3243B	S43 Modesto Empire to S43 Merced Municipal Airport via E99	304, 315, 318, 403, 404, 405	217, 222, 306
A3244A	S32 Modesto Empire to S44 Merced SP Downtown via BN	304, 307, 316, 404, 320, 322	218, 219, 405
A3244B	S32 Modesto Empire to S44 Merced SP Downtown via E99	304, 315, 318, 403, 404, 320, 322	217, 222, 306, 405
A3245A	S32 Modesto Empire to S45 Merced Plainsburg via BN	304, 307, 314, 402, 406	218, 219
A3245B	S32 Modesto Empire to S44 Merced SP Downtown via E99	304, 315, 318, 402, 406	217, 222, 306
A3341	S33 Modesto SP Downtown to S41 Merced Castle	Not Applicable	
A3342	S33 Modesto SP Downtown to S42 Merced University	Not Applicable	
A3343A	S33 Modesto SP Downtown to S43 Merced Municipal Airport via UP	303, 313, 311	301, 312
A3343B	S33 Modesto SP Downtown to S43 Merced Municipal Airport via W99	302, 308, 309	301, 305
A3344A	S33 Modesto SP Downtown to S44 Merced SP Downtown via SP	303, 313, 321, 322	301, 312, 311
A3344B	S33 Modesto SP Downtown to S44 Merced SP Downtown via W99	302, 308, 310, 322	301, 305
A3345	S33 Modesto SP Downtown to S45 Merced Plainsburg	Not Applicable	
A3441	S34 Modesto West to S41 Merced Castle	Not Applicable	
A3442	S34 Modesto West to S42 Merced University	Not Applicable	
A3443	S34 Modesto West to S43 Merced Municipal Airport	301, 305, 308, 309	N/A
A3444A	S34 Modesto West to S44 Merced SP Downtown via W99	301, 305, 308, 310, 322	309
A3444B	S34 Modesto West to S44 Merced SP Downtown via SP	301, 312, 313, 321, 322	311
A3445	S34 Modesto West to S45 Merced Plainsburg	Not Applicable	

C. STATION SCREENING CONSIDERATIONS

S31 Modesto Amtrak Briggsmore

Planning: The S31 Amtrak Briggsmore site is the location of a recently opened Amtrak station in the northeastern part of Modesto. This is a suburban site, but within the growth areas of the metropolitan Modesto area. The site could serve as a transfer point with Amtrak San Joaquin services to intermediate East Bay and Central Valley stations not planned to be served by HSR.

Engineering: The station site can be located on a stopping track alignment with a high-speed through route to the east of the site. Alternatively a full speed alignment with a standard configuration station is possible but may be less compatible with growing residential uses in the area.

Cost: Either station configuration would incur moderate capital costs.

Environmental: This site affects a scenic corridor, one natural stream, one wetland, and an endangered/threatened species. In addition, it partially resides within the 100-year floodplain and occupies a significant portion of prime, unique, and important farmland. Conversely, the Amtrak Briggsmore sites consists of predominantly compatible land uses and would not affect any environmental justice communities, nationally registered historic sites, public parks, or recreation areas.

S32 Modesto Empire

Planning: The S32 Empire site lies within an industrial area with extensive freight rail facilities, especially for agricultural products. The site is somewhat more accessible than S31 Amtrak Briggsmore, due to arterial access highways. The site would not have the Amtrak synergy of the S31 site. However, extensive freight railroad interactions would complicate construction of a station in this location.

Engineering: The site is close to the difficult intersection of Yosemite Blvd and Santa Fe Avenue and its associated numerous rail grade crossings. Otherwise the site is similar in operation and configuration to the S31 site.

Cost: The station would incur moderate capital costs.

Environmental: Although 47% of the station area occupies incompatible land uses, it would not affect any natural streams, wetlands, floodplains, nationally registered historic sites, public parks, or recreation areas. The Empire site may affect one endangered/threatened species and 116 acres of prime, unique, or important farmland.

S33 Modesto SP Downtown

Planning: The S33 SP Downtown Station site lies in the city center and transit hub of Modesto on the SP route. The site has good connectivity to the SR 99 Freeway and is close to downtown destinations.

Engineering: The site is constrained by a narrow right-of-way on a busy UP freight rail corridor with numerous access sidings and some sharp curves. It can only be reached by a stopping track, with high-speed through service on the W99 alignment. The site may also be too small for the ancillary services needed at a HSR station.

Cost: The station would incur relatively high capital costs, due to denser urban uses in the station area.

Environmental: The Downtown site affects a significant number of minorities and low-income households, resulting in considerable environmental justice concerns. In addition, it affects one public park or recreation area, one nationally registered historic site, and one endangered/threatened species. However, the land uses in the station area are predominantly compatible and the site would not affect any wetlands, natural streams, floodplains, or farmlands.

S34 Modesto West

Planning: The S34 Modesto West station site is a conceptual point where the W99 route crosses SR 132. The site would be considered a suburban location, although currently in agricultural use. Modesto's development is moving to the north and east, however, away from this site.

Engineering: The station would be in the standard four-track configuration.

Cost: The standard station configuration in a greenfield setting will be moderate in cost.

Environmental: This site would not affect any wetlands, natural streams, floodplains, nationally registered historic sites, public parks, or recreation areas. However, the Modesto West site occupies an area that is almost entirely composed of prime, unique, or important farmland and potentially affects one endangered/threatened species.

S35 Modesto East









Planning: The S35 Modesto East station site is a conceptual point in an eastern Central Valley location where the E99 alignment crosses SR 132. It is in agricultural land considerably east of current and planned development for Modesto, creating long access routes to the site.

Engineering: The station would be in the standard four-track configuration.

















Cost: The standard station configuration in a greenfield setting will be moderate in cost.

















Environmental: The Modesto East site occupies land that is composed entirely of compatible land uses, would not pose any environmental justice concerns, and would not affect significant farmlands, nationally registered historic sites, wetlands, sensitive wildlife habitat, public parks, or recreation areas. However, it would potentially affect one natural stream and one scenic corridor, as well as occupy a tiny portion of the 100-year floodplain.





Table 4.1.3C
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Modesto Stations

Evaluation Criteria	Station S31 Modesto Amtrak Briggsmore	Station S32 Modesto Empire	Station S33 Modesto SP Downtown	Station S34 Modesto West
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Population/Employment Catchment				
				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	<ul style="list-style-type: none"> Suburban location Freeway access: distant from 99 Fwy Street access: off Briggsmore Rd, an arterial hwy in northeastern part of city Parking: ample land opportunity in vicinity, shared use with Amtrak Transit: served by MAX buses Other rail: Site of new Amtrak station. Potential transfer point for Amtrak San Joaquin service to the East Bay area. 	<ul style="list-style-type: none"> Suburban location Freeway access: Distant from 99 Fwy Street access: on SR 132, Yosemite Avenue, a busy industrial highway. Intersection with Santa Fe Avenue a source of congestion. Parking: ample land opportunity in vicinity Transit: served by MAX buses Other rail: none 	<ul style="list-style-type: none"> Downtown location Freeway access: within two blocks of 99 Fwy at Central Modesto exit Street access: on downtown street grid with considerable traffic congestion Parking: highly constrained in central core of city and on site. Transit: Existing SP Depot is MAX central transfer hub and transportation center. Other rail: none currently, possible future ACE extension 	<ul style="list-style-type: none"> Outlying location Freeway access: distant from 99 Fwy Street access: on SR 132, Maze Blvd, a busy farm to market road Parking: unconstrained Transit: none Other rail: none
				

Evaluation Criteria	Station S31 Modesto Amtrak Briggsmore	Station S32 Modesto Empire	Station S33 Modesto SP Downtown	Station S34 Modesto West
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Operational Issues	<ul style="list-style-type: none"> Stopping track alignment Railroad interaction: Along BNSF r-o-w, normal coordination Amtrak coordination necessary and mutually beneficial 	<ul style="list-style-type: none"> Stopping track alignment Railroad interaction: Along BNSF r-o-w, normal coordination. Also junction with short line freight rail feeders, with much BNSF interchange activity 	<ul style="list-style-type: none"> Stopping track alignment Railroad interaction: Along UP r-o-w, normal coordination. Constrained operating environment through central Modesto 	<ul style="list-style-type: none"> Through track alignment Railroad interaction: none, new alignment
Construction Issues	Transfer station with Amtrak requires architectural and logistical care. Otherwise relatively straightforward construction.	Once ATSF Modesto station site. Appropriate site for HSR station straightforward. Alignment of HSR not to impede freight interchange may be complex, but manageable.	Site is narrow. Coexistence with historic depot an architectural and logistical challenge. Many grade separations throughout central city.	Standard intermediate station design.
Capital Cost	Moderate	Station costs moderate, access roadways and intersection solutions costly	Expected to be expensive, especially track approaches and grade separations.	Moderate to low.
Right-of-Way Issues/Cost	Along BNSF, adequate r-o-w present for additional HSR presence	Along BNSF, adequate r-o-w present for additional HSR presence. Appropriate alignment for HSR to be determined.	Land assembly for station and facilities may be complicated.	Open agricultural land on new alignment.

Evaluation Criteria	Station S31 Modesto Amtrak Brigsmore	Station S32 Modesto Empire	Station S33 Modesto SP Downtown	Station S34 Modesto West
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	1.72	47.19	22.73	0
Primary Land Uses (acreage) within station area	Farmland/Agriculture (175); Mixed Use (141); Office (164)	Commercial (70); Farmland/Agriculture (74); Institutional (91); Residential (237)	Mixed Use (389); Residential (114)	Farmland /Agriculture (503)
Rank				
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	1.72	47.19	22.73	0
Number of scenic corridor and scenic river crossings	1	0	0	0
Rank				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	1	0	0	0
Number of Wetland Crossings	1	0	0	0
Total Acreage of Wetlands within Station Area	2.09	0	0	0
Rank				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	1	0	0	0
Total Acreage of FEMA Floodplain Crossings within Station Area	2.64	0	0	0
Rank				

Evaluation Criteria	Station S31 Modesto Amtrak Briggsmore	Station S32 Modesto Empire	Station S33 Modesto SP Downtown	Station S34 Modesto West
Threatened & Endangered Species Impacts				
Count of Species	1	1	1	1
Acreage of Sensitive Habitat within Station Area	0	0	0	0
Rank				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	0	0	5100	0
Low Income Within 1,400' Buffer – 1990 Households	0	0	158	0
Rank				
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	225.09	116.23	0	502.15
Rank				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0	0	1	0
Rank				

Evaluation Criteria	Station S31 Modesto Amtrak Briggsmore	Station S32 Modesto Empire	Station S33 Modesto SP Downtown	Station S34 Modesto West
Parks & Recreation/Wildlife Refuge Impacts				
Count of Parks/Recreation Areas	0	0	1	0
Total Acreage Parks/Recreation Areas in Station Area	0	0	0.70	0
Rank				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				















Least Favorable Most Favorable

Table 4.1.3C continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Modesto Stations

Evaluation Criteria	Station S35 Modesto East			
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable			
Length	Not Applicable			
Population/Employment Catchment				
				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections				
				
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable			
Operational Issues				
				
Construction Issues	None, open land.			
				

Evaluation Criteria	Station S35 Modesto East			
Capital Cost	Low, open site.			
	●			
Right-of-Way Issues/Cost	Farmland issues but not developed. Low cost.			
	●			
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	0			
Primary Land Uses (acreage) within station area	Farmland/Agriculture (503.02)			
Rank	●			
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	0			
Number of scenic corridor and scenic river crossings	1			
Rank	●			

Evaluation Criteria	Station S35 Modesto East			
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	1			
Number of Wetland Crossings	0			
Total Acreage of Wetlands within Station Area	0			
Rank				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	1			
Total Acreage of FEMA Floodplain Crossings within Station Area	9.19			
Rank				
Threatened & Endangered Species Impacts				
Count of Species	0			
Acreage of Sensitive Habitat within Station Area	0			
Rank				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	0			
Low Income Within 1,400' Buffer – 1990 Households	0			
Rank				

Evaluation Criteria	Station S35 Modesto East			
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	0			
Rank				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0			
Rank				
Parks & Recreation/Wildlife Refuge Impacts				
Count of Parks/Recreation Areas	0			
Total Acreage Parks/Recreation Areas in Station Area	0			
Rank				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				

Evaluation Criteria	Station S35 Modesto East			
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

    
Least Favorable Most Favorable

D. ALIGNMENT SCREENING CONSIDERATIONS

This segment starts with approaches on only two of the four major routes but can leave the Modesto area on all four routes. The general considerations for each of them apply to this segment.

The SP alignment to the S33 Modesto SP Downtown station involves the most densely built up land uses in the area. It can be used for a stopping track alignment to reach the downtown station, but involves grade separation through aerial structure or trenching throughout the area. A high-speed through route is necessary to provide nonstop train service around the alignment.

The S31 Modesto Amtrak Briggsmore and S32 Modesto Empire stations can be located on high-speed alignments or on stopping tracks with a high-speed through route on the E99 alignment. The high-speed four-track configuration would require more right-of-way in the suburban areas.

W99 and E99 alignments have the general characteristics of the routes and pose no significant engineering challenges. General environmental considerations also apply.

Overview of Environmental Impacts in the 27 Alignment Variations

Alignment variations between Modesto and Merced were analyzed using the nine environmental evaluation criteria.

The alignment exhibiting the lowest level of impact is:

- A3241B Modesto Empire to Merced Castle via E99.

It rated to be in the lowest impact categories for all criteria except land use. It exhibited an intermediate level of impact on land use compatibility

Two other alignments had somewhat more impacts. These are:

- A3141B Modesto Amtrak Briggsmore to Merced Castle via E99, and
- A3241A Modesto Empire to Merced Castle via BN.





















A3141B has similar levels of impact as A3241B, above, in all criteria except visual, water resources, farmland, and parks and recreation impacts. For these three criteria, A3141B had somewhat greater levels of impact. A3241A was similar to A3241B in all categories except farmland and parks and recreation. It has somewhat fewer farmland impacts, but considerably more impacts on parks and recreation.





















Three alignments exhibiting the greatest level of impacts are:

















- A3245A Modesto Empire to Merced Plainsburg via BN
- A3145A Modesto Amtrak Briggsmore to Merced Plainsburg via BN, and
- A3145B Modesto Amtrak Briggsmore to Merced Plainsburg via E99.

These three had much greater impacts on visual, water resources, and threatened and endangered species, and somewhat greater impacts on floodplains, environmental justice. The first two, to Merced Plainsburg via BN, had a high level of impacts on parks and recreation, when compared to the other alignments noted above.

Table 4.1.3D
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Modesto to Merced Alignment

Evaluation Criteria	Alignment A3141A	Alignment A3141B	Alignment A3142A	Alignment A3142B
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 10.91 minutes Mag 9.33 minutes	VHS 10.99 minutes Mag 9.41 minutes	VHS 12.77 minutes Mag 11.04 minutes	VHS 12.86 minutes Mag 11.12 minutes
				
Length	27.42 miles 44.14 km	27.75 miles 44.67 km	34.27 miles 55.16 km	34.60 miles 55.68 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Shorter and less costly of the two A3141 alternatives	Longer and more costly of the two A3141 alternatives (due to extra through route miles)	Shorter and less costly of the two A3142 alternatives	Longer and more costly of the two A3142 alternatives
				
Operational Issues	BNSF alignment New alignment to Castle	New alignment most of the route	BNSF and new alignment	New alignment most of the route
				
Construction Issues	Freight coordination Amtrak coordination	Freight coordination Amtrak coordination	Freight coordination Amtrak coordination	Freight coordination Amtrak coordination
				





















Evaluation Criteria	Alignment A3141A	Alignment A3141B	Alignment A3142A	Alignment A3142B
Capital Cost	Moderate cost	Moderate to low cost as mostly new alignment.	Moderate cost	Moderate cost
				
Right-of-Way Issues/Cost	BNSF upgrade and new alignment	Mostly new alignment	BNSF upgrade and new alignment	Mostly new alignment
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	7.82	7.49	6.64	6.38
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	2.00	2.00	3.00	3.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	4.00	6.00	6.00	8.00
Number of Wetland Crossings	3.00	6.00	6.00	9.00
Total Acreage of Wetlands Within ROW	1.26	2.99	2.46	4.19
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	3.00	3.00	5.00	5.00
Associated Length (meters) of Floodplain Crossings	454.80	523.17	2392.78	2461.15
Total Acreage of FEMA Floodplain Crossings	3.59	3.94	18.16	18.51

Evaluation Criteria	Alignment A3141A	Alignment A3141B	Alignment A3142A	Alignment A3142B
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	0.00	1.00	1.00	2.00
Count of Species along ROW	0.00	0.00	0.00	0.00
Sensitive Habitat Acreage w/in ROW	0.00	9.08	0.00	9.08
Net Sensitive Habitat Acreage along ROW	0.00	27.24	0.55	27.79
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	3120.00	1963.00	5083.00	3926.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	210.80	264.55	242.66	296.41
RANKING				

Evaluation Criteria	Alignment A3141A	Alignment A3141B	Alignment A3142A	Alignment A3142B
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	14.26	0.00	14.26	0.00
Total Acreage of Parks/Recreation Areas along ROW	42.81	0.00	42.81	0.00
Incidences of Parks/Recreation Areas in ROW	1.00	0.00	1.00	0.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
RANKING	○	●	○	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.3D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Modesto to Merced Alignment





















Evaluation Criteria	Alignment A3143A	Alignment A3143B	Alignment A3144A	Alignment A3144B
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 13.38 minutes Mag 11.59 minutes	VHS 13.31 minutes Mag 11.53 minutes	VHS 13.63 minutes Mag 11.83 minutes	VHS 13.56 minutes Mag 11.77 minutes
Length	36.48 miles 58.71 km	36.24 miles 58.32 km	37.42 miles 60.22 km	37.18 miles 59.83 km
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Longer and more costly of the two A3143 alternatives	Shorter and less costly of the two A3143 alternatives	Longer and more costly of the two A3144 alternatives	Shorter and less costly of the two A3144 alternatives
Operational Issues	BNSF ROW and new ROW	New ROW	BNSF ROW and new ROW	New ROW
Construction Issues	Freight coordination Amtrak coordination	New ROW	Freight coordination Amtrak coordination	New ROW

























Evaluation Criteria	Alignment A3143A	Alignment A3143B	Alignment A3144A	Alignment A3144B
Capital Cost	Moderate to high cost	Moderate cost	Moderate to high cost	Moderate cost
				
Right-of-Way Issues/Cost	BNSF ROW and new ROW	New ROW	BNSF ROW and new ROW	New ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	7.50	6.22	8.36	6.93
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	2.00	2.00	2.00	2.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	7.00	9.00	6.00	8.00
Number of Wetland Crossings	5.00	9.00	4.00	8.00
Total Acreage of Wetlands Within ROW	1.96	4.14	1.46	3.65
RANKING				

Evaluation Criteria	Alignment A3143A	Alignment A3143B	Alignment A3144A	Alignment A3144B
Floodplain Impacts				
Number of FEMA Floodplain Crossings	10.00	9.00	8.00	7.00
Associated Length (meters) of Floodplain Crossings	8393.50	7237.25	8987.31	7831.05
Total Acreage of FEMA Floodplain Crossings	52.10	54.42	50.40	52.71
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	0.00	1.00	1.00	2.00
Count of Species along ROW	1.00	1.00	0.00	0.00
Sensitive Habitat Acreage w/in ROW	0.00	15.09	0.00	15.09
Net Sensitive Habitat Acreage along ROW	0.00	44.94	0.00	44.94
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	4819.00	7849.00	7786.00	10816.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	207.30	324.62	199.83	317.16
RANKING				

Evaluation Criteria	Alignment A3143A	Alignment A3143B	Alignment A3144A	Alignment A3144B
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	14.26	0.00	14.26	0.00
Total Acreage of Parks/Recreation Areas along ROW	42.81	0.00	42.83	0.02
Incidences of Parks/Recreation Areas in ROW	1.00	0.00	1.00	0.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	1.00	1.00
RANKING	○	●	○	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.3D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Modesto to Merced Alignment





















Evaluation Criteria	Alignment A3145A	Alignment A3145B	Alignment A3241A	Alignment A3241B
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 15.69 minutes Mag 13.72 minutes	VHS 15.78 minutes Mag 13.80 minutes	VHS 10.33 minutes Mag 8.80 minutes	VHS 10.42 minutes Mag 8.89 minutes
				
Length	44.97 miles 72.38 km	45.30 miles 72.90 km	25.33 miles 40.76 km	25.66 miles 41.29 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Shorter and less costly of the two A3145 alternatives	Longer and more costly of the two A3145 alternatives	Shorter and less costly of the two A3241 alternatives	Longer and more costly of the two A3241 alternatives
				
Operational Issues	BNSF and new ROW Freight coordination	New ROW	BNSF and new ROW Freight coordination	New ROW
				
Construction Issues	BNSF and new ROW	New ROW	BNSF and new ROW	New ROW
				

Evaluation Criteria	Alignment A3145A	Alignment A3145B	Alignment A3241A	Alignment A3241B
Capital Cost	Moderate cost	Moderate cost	Moderate cost	Moderate cost
				
Right-of-Way Issues/Cost	BNSF and new ROW	New ROW	BNSF and new ROW	New ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	7.90	7.95	5.63	5.27
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	3.00	4.00	1.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	9.00	12.00	3.00	5.00
Number of Wetland Crossings	10.00	14.00	2.00	5.00
Total Acreage of Wetlands Within ROW	42.94	44.95	0.57	2.29
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	6.00	7.00	2.00	2.00
Associated Length (meters) of Floodplain Crossings	5087.38	5356.97	334.95	403.32
Total Acreage of FEMA Floodplain Crossings	35.70	37.57	2.69	3.04
RANKING				





















Evaluation Criteria	Alignment A3145A	Alignment A3145B	Alignment A3241A	Alignment A3241B
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	13.00	14.00	0.00	1.00
Count of Species along ROW	0.00	0.00	0.00	0.00
Sensitive Habitat Acreage w/in ROW	33.63	42.72	0.00	9.08
Net Sensitive Habitat Acreage along ROW	101.39	128.63	0.00	27.24
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	8359.00	7202.00	3120.00	1963.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	342.63	347.74	199.33	253.07
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING				

Evaluation Criteria	Alignment A3145A	Alignment A3145B	Alignment A3241A	Alignment A3241B
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	14.26	0.00	14.26	0.00
Total Acreage of Parks/Recreation Areas along ROW	43.18	0.37	42.81	0.00
Incidences of Parks/Recreation Areas in ROW	1.00	0.00	1.00	0.00
Incidences of Parks/Recreation Areas along ROW	1.00	1.00	0.00	0.00
RANKING	○	●	○	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.3D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Modesto to Merced Alignment





















Evaluation Criteria	Alignment A3242A	Alignment A3242B	Alignment A3243A	Alignment A3243B
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 12.20 minutes Mag 10.52 minutes	VHS 12.29 minutes Mag 10.60 minutes	VHS 12.80 minutes Mag 11.07 minutes	VHS 12.74 minutes Mag 11.01 minutes
				
Length	32.17 miles 51.78 km	32.50 miles 52.31 km	34.38 miles 55.34 km	34.14 miles 54.94 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Shorter but more costly of the two A3242 alternatives	Longer but less costly of the two A3242 alternatives	Longer but less costly of the two A3243 alternatives	Shorter but more costly of the two A3243 alternatives
				
Operational Issues	BNSF and new ROW Freight coordination	New ROW	BNSF and new ROW Freight coordination	New ROW
				
Construction Issues	BNSF and new ROW	New ROW	BNSF and new ROW	New ROW
				





















Evaluation Criteria	Alignment A3242A	Alignment A3242B	Alignment A3243A	Alignment A3243B
Capital Cost	Moderate cost	Moderate to low cost	Moderate cost	Moderate cost
Right-of-Way Issues/Cost	BNSF and new ROW	New ROW	BNSF and new ROW	New ROW
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	4.85	4.57	5.29	4.82
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	2.00	2.00	1.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	5.00	7.00	6.00	8.00
Number of Wetland Crossings	5.00	8.00	4.00	7.00
Total Acreage of Wetlands Within ROW	1.77	3.49	1.26	2.98
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	4.00	4.00	9.00	7.00
Associated Length (meters) of Floodplain Crossings	2272.92	2341.29	8273.65	6856.12
Total Acreage of FEMA Floodplain Crossings	17.25	17.60	51.19	51.54





















Evaluation Criteria	Alignment A3242A	Alignment A3242B	Alignment A3243A	Alignment A3243B
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	1.00	2.00	0.00	1.00
Count of Species along ROW (Adjacent Buffer-ROW)	0.00	0.00	1.00	1.00
Sensitive Habitat Acreage (ROW)	0.00	9.08	0.00	9.08
Net Sensitive Habitat Acreage (Adjacent -ROW)	0.55	27.79	0.00	27.24
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	5083.00	3926.00	4819.00	5886.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	231.19	284.93	195.82	311.08
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	14.26	0.00	14.26	0.00

Evaluation Criteria	Alignment A3242A	Alignment A3242B	Alignment A3243A	Alignment A3243B
Total Acreage of Parks/Recreation Areas along ROW	42.81	0.00	42.81	0.00
Incidences of Parks/Recreation Areas in ROW	1.00	0.00	1.00	0.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
RANKING	○	●	○	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.3D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Modesto to Merced Alignment





















Evaluation Criteria	Alignment A3244A	Alignment A3244B	Alignment A3245A	Alignment A3245B
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 13.06 minutes Mag 11.30 minutes	VHS 12.99 minutes Mag 11.24 minutes	VHS 15.12 minutes Mag 13.19 minutes	VHS 15.21 minutes Mag 13.27 minutes
				
Length	35.32 miles 56.84 km	35.08 miles 56.45 km	42.87 miles 69.00 km	43.20 miles 69.53 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Longer and more costly of the two A3244 alternatives	Shorter and less costly of the two A3244 alternatives	Shorter and less costly of the two A3245 alternatives	Longer and more costly of the two A3245 alternatives
				
Operational Issues	BNSF, UP, and new ROW Freight coordination	UP and new ROW Freight coordination	BNSF and new ROW Freight coordination	New ROW
				
Construction Issues	BNSF, UP, and new ROW	UP and new ROW	BNSF and new ROW	New ROW
				





















Evaluation Criteria	Alignment A3244A	Alignment A3244B	Alignment A3245A	Alignment A3245B
Capital Cost	Moderate to high cost	Moderate to high cost	Moderate cost	Moderate to low cost
				
Right-of-Way Issues/Cost	BNSF, UP, and new	UP and new	BNSF and new	New ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	6.33	5.29	6.88	6.67
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	1.00	3.00	3.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	5.00	7.00	9.00	11.00
Number of Wetland Crossings	3.00	7.00	10.00	13.00
Total Acreage of Wetlands Within ROW	0.76	2.95	42.53	44.25
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	7.00	6.00	6.00	6.00
Associated Length (meters) of Floodplain Crossings	8867.46	7711.20	5168.74	5237.12





















Evaluation Criteria	Alignment A3244A	Alignment A3244B	Alignment A3245A	Alignment A3245B
Total Acreage of FEMA Floodplain Crossings	49.49	51.81	36.31	36.66
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	1.00	2.00	13.00	14.00
Count of Species along ROW	0.00	0.00	0.00	0.00
Sensitive Habitat Acreage (ROW)	0.00	15.09	33.63	42.72
Net Sensitive Habitat Acreage (Adjacent -ROW)	0.00	44.94	101.39	128.63
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	7786.00	10816.00	8359.00	7202.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	188.36	305.69	282.52	336.27
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	14.26	0.00	14.26	0.00

Evaluation Criteria	Alignment A3244A	Alignment A3244B	Alignment A3245A	Alignment A3245B
Total Acreage of Parks/Recreation Areas along ROW	42.83	0.02	43.18	0.37
Incidences of Parks/Recreation Areas in ROW	1.00	0.00	1.00	0.00
Incidences of Parks/Recreation Areas along ROW	1.00	1.00	1.00	1.00
RANKING	○	●	○	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.3D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Modesto to Merced Alignment













Evaluation Criteria	Alignment A3343A	Alignment A3343B	Alignment A3344A	Alignment A3344B
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 13.40 minutes Mag 11.61 minutes	VHS 14.11 minutes Mag 12.27 minutes	VHS 13.53 minutes Mag 11.73 minutes	VHS 14.44 minutes Mag 12.57 minutes
				
Length	36.57 miles 58.85 km	39.17 miles 63.04 km	37.04 miles 59.60 km	40.40 miles 65.02 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Shorter but more costly of the two A3343 alternatives	Longer but less costly of the two A3343 alternatives	Shorter but more costly of the two A3344 alternatives	Longer but less costly of the two A3344 alternatives
				
Operational Issues	UP Freight coordination	New ROW	UP Freight coordination	New ROW and UP
				
Construction Issues	UP coordination	New ROW	UP coordination	New ROW
				



















Evaluation Criteria	Alignment A3343A	Alignment A3343B	Alignment A3344A	Alignment A3344B
Capital Cost	High cost	Moderate cost	High cost	Moderate to high cost
				
Right-of-Way Issues/Cost	UP ROW	New ROW	UP ROW	New ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	12.16	11.62	12.33	11.04
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	1.00	1.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	5.00	5.00	4.00	8.00
Number of Wetland Crossings	2.00	8.00	3.00	9.00
Total Acreage of Wetlands Within ROW	0.19	3.17	0.38	3.37
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	4.00	3.00	5.00	9.00
Associated Length (meters) of Floodplain Crossings	7176.18	6545.27	6828.69	7454.82
Total Acreage of FEMA Floodplain Crossings	53.81	48.67	44.93	49.51













Evaluation Criteria	Alignment A3343A	Alignment A3343B	Alignment A3344A	Alignment A3344B
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	2.00	1.00	3.00	2.00
Count of Species along ROW (Adjacent Buffer-ROW)	2.00	1.00	1.00	0.00
Sensitive Habitat Acreage (ROW)	0.00	0.00	0.00	0.00
Net Sensitive Habitat Acreage (Adjacent -ROW)	0.00	0.00	0.00	0.00
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	16595.00	12533.00	19562.00	15500.00
Low Income Within 1,400' Buffer – 1990 Households	121.00	121.00	121.00	121.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	172.99	361.41	145.83	364.10
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING				







Evaluation Criteria	Alignment A3343A	Alignment A3343B	Alignment A3344A	Alignment A3344B
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	11.90	4.33	11.90	4.33
Total Acreage of Parks/Recreation Areas along ROW	32.83	23.15	32.85	23.17
Incidences of Parks/Recreation Areas in ROW	2.00	3.00	2.00	3.00
Incidences of Parks/Recreation Areas along ROW	2.00	1.00	3.00	2.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

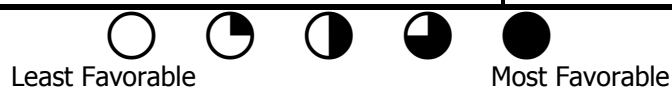
Table 4.1.3D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Modesto to Merced Alignment

Evaluation Criteria	Alignment A3443	Alignment A3444A	Alignment A3444B	
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 14.38 minutes Mag 12.51 minutes	VHS 14.71 minutes Mag 12.82 minutes	VHS 14.93 minutes Mag 13.02 minutes	
				
Length	40.15 miles 64.62 km	41.38 miles 66.60 km	42.17 miles 67.87 km	
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	
<i>Minimize Operating and Capital Costs.</i>				
Length	Short alignment but all new right-of-way	Shorter and less costly of the two A3444 alternatives	Longer and more costly of the two A3444 alternatives	
				
Operational Issues	New ROW	New ROW and SP Freight coordination	SP Freight coordination	
				

Evaluation Criteria	Alignment A3443	Alignment A3444A	Alignment A3444B	
Construction Issues	New ROW		SP coordination	
				
Capital Cost	Moderate cost	Moderate cost	High cost	
				
Right-of-Way Issues/Cost	New ROW	New ROW and SP	SP and UP coordination	
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	7.73	7.30	7.38	
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	1.00	1.00	
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	5.00	8.00	4.00	
Number of Wetland Crossings	7.00	8.00	4.00	
Total Acreage of Wetlands Within ROW	2.12	2.31	1.05	
RANKING				

Evaluation Criteria	Alignment A3443	Alignment A3444A	Alignment A3444B	
Floodplain Impacts				
Number of FEMA Floodplain Crossings	3.00	9.00	4.00	
Associated Length (meters) of Floodplain Crossings	7298.04	8207.59	7655.76	
Total Acreage of FEMA Floodplain Crossings	54.88	55.71	51.38	
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	0.00	1.00	3.00	
Count of Species along ROW (Adjacent Buffer-ROW)	1.00	0.00	1.00	
Sensitive Habitat Acreage (ROW)	0.00	0.00	0.00	
Net Sensitive Habitat Acreage (Adjacent -ROW)	0.00	0.00	0.00	
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	8316.00	11283.00	15687.00	
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	422.39	425.08	281.20	
RANKING				

Evaluation Criteria	Alignment A3443	Alignment A3444A	Alignment A3444B	
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	
Number of National Register Resources along ROW	0.00	0.00	0.00	
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	1.70	1.70	10.25	
Total Acreage of Parks/Recreation Areas along ROW	11.93	11.95	28.05	
Incidences of Parks/Recreation Areas in ROW	2.00	2.00	1.00	
Incidences of Parks/Recreation Areas along ROW	0.00	1.00	1.00	
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				



4.1.4 Merced to Fresno Segment

This segment operates from stations in Merced to the next station city of Fresno. In the Merced area, five station sites have been evaluated. All four general routes arrive in the Merced area as high-speed alternatives. The E99 and the BNSF routes flow together into the BNSF route south of Merced and separate again from each other before reaching the Fresno area. This again forms an eastern group of alignments, serving the eastern station sites. As in the previous segment, the SP and W99 routes form a western group of alignments, serving the western station sites, and remain on the west throughout the region. However, unlike in the previous segments, the BNSF and E99 routes can reach all the station sites in the Merced area before once again leaving the region toward the south. The unique geographical characteristic of the central Merced area is the relative proximity to each other of all the alignments. Thus, Merced is the point in the Central Valley where the greatest flexibility exists for a selected high-speed route to change general alignment corridors and thus exploit the optimal station sites and routes both north and south of the city. A cross-valley connection may be most easily built in the Merced area for high-speed rail, but a new BNSF to SP connection farther south could also be considered in the context of the ongoing Fresno Rail Consolidation process.

A. THE MERCED STATION SITES ARE:

S41 Merced Castle

The Merced Castle station site is located on the grounds of the former Castle Air Force Base, which has been demobilized. The site is located in the area between the cities of Atwater and Merced along County Route J7, Santa Fe Avenue. The BNSF right-of-way is across this street from the site and parallel to the highway. The former Air Force Base is a large plot of land with a multitude of prospective land uses, many of them transportation related. The specific location of the station will depend on the aviation uses that will remain or be instituted at the site and on the other reuses of the property as they are determined by local agencies. The station is envisioned as a standard configuration station on high-speed alignments, whether in a loop from the BNSF main line or as part of the East of 99 new alignment.

S42 Merced University

The Merced University station site is located on the north side of Bellevue Road in a conceptual high-speed corridor parallel to the planned Bellevue Expressway now in planning. The station could be either at M Street or G Street, depending on City of Merced and UC Merced planning determinations. The station would be designed in the standard configuration.

S43 Merced Municipal Airport

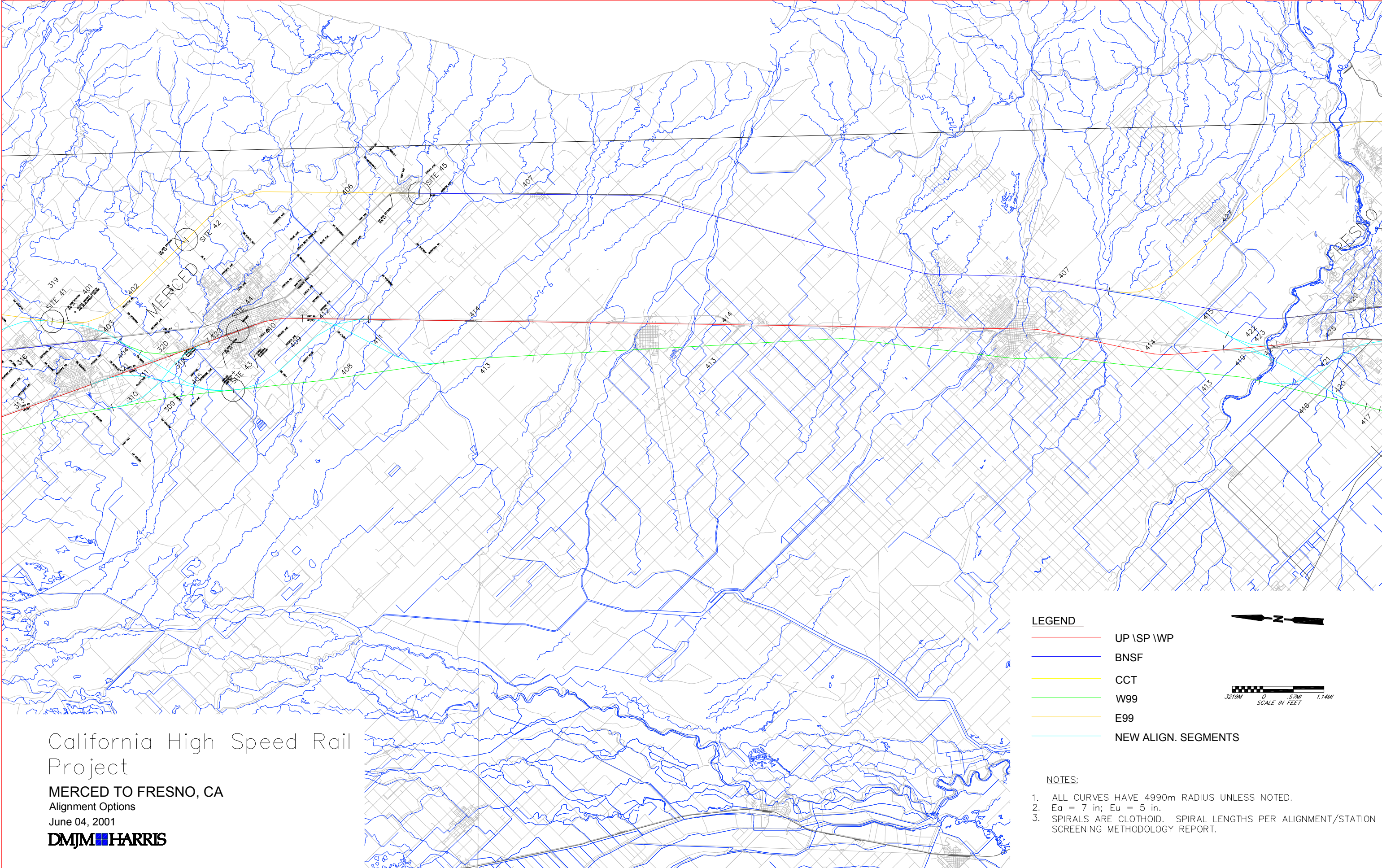
The Merced Municipal Airport station site is located on the grounds of the existing MCE airport complex. The exact location and orientation of the station would depend on aviation requirements and the location of the new high speed alignment that serves it. The station would be designed in the standard configuration.

S44 Merced SP Downtown

The Merced SP Downtown station would be located in conjunction with the existing transit center on the site of the original Southern Pacific depot on 16th Street between M and P Streets.

S45 Merced Plainsburg

The Merced Plainsburg station would be in a suburban location on Plainsburg Road along the BNSF existing rail route near where a conceptual East of 99 alignment would meet the existing rail route. The locality is known locally and on the railroad as Planada.



California High Speed Rail Project

MERCED TO FRESNO, CA

Alignment Options

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DMJM HARRIS

B. THE MERCED ALIGNMENT GROUPINGS ARE:

Leaving Merced, three of the four general routes are available. On the eastern side, the E99 high-speed alignment flows into the BNSF route and takes the same route to a point, conceptually in Madera County, where the E99 once again diverges to the east. On the western side, the SP and W99 routes are available for high-speed service.

All of these routes can be accessed on high-speed alignments from Station S41 Merced Castle. The line uses the E99 via Line Segment 402 and 406 and joins the combined E99 and BNSF route via Line Segment 407. The BNSF route can be joined to western routes via Line Segment 415, while the E99 route again diverges to an eastern conceptual freeway alignment via Line Segment 427. The route from S41 Merced Castle to the western alignments uses Line Segments 403, 404, 317, 405, 408 and 413 to reach the W99 alignment. Similarly, Line Segments 403, 404, 317, 405, 409, and 414 give access to the high-speed SP route south of Merced.

Stations S42 Merced University and S45 Merced Plainsburg can only access the combined E99 and BNSF routes on the east. This access is via Line Segments 406 and 407, with the downstream divergence again consisting of Line Segments 415 and 427.

Station S43 Merced West can continue on the W99 route via Line Segments 405, 408, 413, 416, 417, and 418. The SP high-speed route can be reached by a new connection along Line Segment 409, making a high-speed connection via Line Segments 405, 409 and 414.

Station S44 Merced SP Downtown is the only Merced site not located on high-speed tracks, but rather on stopping tracks from the four inbound routes. The existing SP route includes stopping tracks via Line Segments 321, 322 410 and 412. Changing to a W99 route from this station involves a new track route via Line Segment 411 to meet the W99 route at Line Segment 413. Reaching Station S44 Merced SP Downtown from the eastern routes from Modesto requires a stopping track, Line Segments 320 and 322, diverging from the cross-valley high-speed connector, Line Segments 403 and 404.

Line Segments 415 and 424 have been included to represent a routing from the BNSF to the SP at a location closer to Fresno that captures the most recent thinking within Fresno County regarding its ongoing Fresno Rail Consolidation process. Line Segments 415 and 420 represent a similar rail consolidation connection from the BNSF route to the W99 route (using Line Segments 417 and 418) closer to Fresno. The existing BNSF route through Fresno includes Station 53 Fresno BNSF Amtrak. Since the purpose of rail consolidation is to remove this alignment from use through the City of Fresno, neither the station nor the alignment is carried forward in the high-speed rail analysis.

Merced Stations Track Alignments

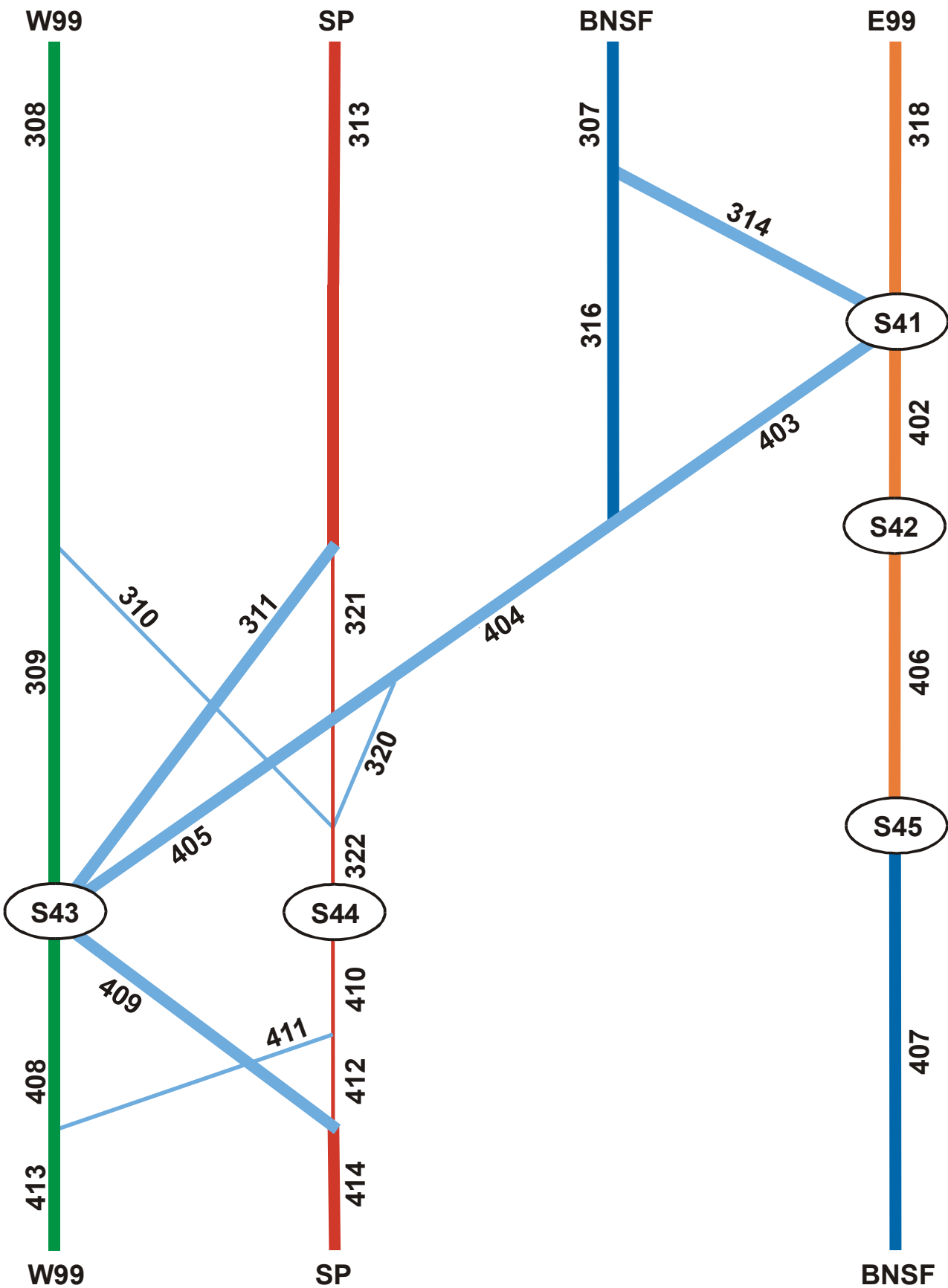


Figure 4.1.4B

Table 4.1.4B

Segment 4
Merced to Fresno
Station to Station Alignments

Alignment #	Stations	Line Segments	Associated Through Line Segments
A4151	S41 Merced Castle to S51 Fresno Downtown	402, 406, 407, 415, 424, 425, 426	422, 420, 417, 418
A4152	S41 Merced Castle to S52 Fresno Chandler Field	402, 406, 407, 415, 422, 420, 417, 428	418
A4153	S41 Merced Castle to S53 Fresno BNSF Amtrak	402, 406, 407, 429	415, 422, 420, 417, 418
A4154	S41 Merced Castle to S54 Fresno Airport	Not Applicable	
A4155	S41 Merced Castle to S55 Fresno East	402, 406, 407, 427,	N/A
A4156	S41 Merced Castle to S56 Fresno West	402, 406, 407, 415, 422, 420, 417, 418	N/A
A4251	S42 Merced University to S51 Fresno Downtown	406, 407, 415, 424, 425, 426	422, 420, 417, 418
A4252	S42 Merced University to S52 Fresno Chandler Field	406, 407, 415, 422, 420, 417, 428	418
A4253	S42 Merced University to S53 Fresno BNSF Amtrak	406, 407, 429	415, 422, 420, 417, 418
A4254	S42 Merced University to S54 Fresno Airport	Not Applicable	
A4255	S42 Merced University to S55 Fresno East	406, 407, 427,	N/A
A4256	S42 Merced University to S56 Fresno West	406, 407, 415, 422, 420, 417, 418	N/A
A4351A	S43 Merced Municipal Airport to S51 Fresno Downtown via W99	408, 413, 421, 426	416, 417, 418
A4351B	S43 Merced Municipal Airport to S51 Fresno Downtown via SP	409, 414, 423, 425, 426	419, 420, 417, 418
A4352A	S43 Merced Municipal Airport to S52 Fresno Chandler Field via W99	408, 413, 416, 417, 428	418
A4352B	S43 Merced Municipal Airport to S52 Fresno Chandler Field via SP9	409, 414, 419, 420, 417, 428	418
A4353	S43 Merced Municipal Airport to S53 Fresno BNSF Amtrak	Not Applicable	
A4354	S43 Merced Municipal Airport to S54 Fresno Airport	Not Applicable	
A4355	S43 Merced Municipal Airport to S55 Fresno East	Not Applicable	
A4451A	S44 Merced SP Downtown to S51 Fresno Downtown via W99	410, 411, 413, 421, 426	408
A4451B	S44 Merced SP Downtown to S51 Fresno Downtown via SP	410, 412, 414, 423, 425, 426	409
A4452A	S44 Merced SP Downtown to S52 Fresno Chandler Field via W99	410, 411, 413, 416, 417, 428	408, 418
A4452B	S44 Merced SP Downtown to S52 Fresno Chandler Field via SP	410, 412, 414, 419, 420, 417, 428	409, 418
A4453	S44 Merced SP Downtown to S53 Fresno BNSF Amtrak	Not Applicable	
A4454	S44 Merced SP Downtown to S54 Fresno Airport	Not Applicable	
A4455	S44 Merced SP Downtown to S55 Fresno East	Not Applicable	
A4456A	S44 Merced SP Downtown to S56 Fresno West via W99	410, 411, 413, 416, 417, 418	408
A4456B	S44 Merced SP Downtown to S56 Fresno West via SP	410, 412, 414, 419, 420, 417, 418	409
A4551	S45 Merced Plainsburg to S51 Fresno Downtown	407, 415, 424, 425, 426	422, 420, 417, 418
A4552	S45 Merced Plainsburg to S52 Fresno Chandler Field	407, 415, 422, 417, 428	418
A4553	S45 Merced Plainsburg to S53 Fresno BNSF Amtrak	407, 429	415, 422, 420, 417, 418
A4554	S45 Merced Plainsburg to S54 Fresno Airport	Not Applicable	
A4555	S45 Merced Plainsburg to Fresno East	407, 427,	N/A
A4556	S45 Merced Plainsburg to S56 Fresno West	407, 415, 422, 420, 417, 418	N/A

C. STATION SCREENING CONSIDERATIONS

S41 Merced Castle

Planning: An S41 Merced Castle station site would be one occupant of the former Castle Air Force Base, located northwest of Merced. The site lies close to the existing BNSF main line and could be accessed by high-speed alignments from both BNSF and E99 routes. The site is suburban in nature and relatively distant from the SR99 Freeway, but will be served by a nearby planned Expressway acting as a beltway loop around the Merced area. Some UC Merced university functions are planned for the site, so internal university transportation systems would access the site.

Engineering: The site lies just north of a possible high-speed rail segment connecting all four general routes through the Central Valley region, providing flexibility in routing toward the Fresno area.

Cost: The site can be considered open, so a station in the standard four-track configuration would be moderate in cost.

Environmental: The Castle site would have few impacts on wetlands, natural streams, scenic corridors or scenic river crossings, cultural resources, parks and recreation, and visual quality. Additionally, this site would not encroach into the 100-year FEMA floodplain. While the site has highly compatible land uses, it also contains a significant amount of sensitive biological habitat within the station area.

S42 Merced University

Planning: The S42 Merced University site would be located within an area now being redesignated for university and new community uses. Merced's growth planning would extend the city's development north to the new university campus, which would encompass the E99 HSR route in its path. A station at this site would need to be accommodated in the City of Merced General Plan update as it is developed.

Engineering: The E99 alignment in this area would follow a line from the S41 Merced Castle site parallel to and north of Bellevue Avenue and the planned expressway/beltway in the same vicinity.

Cost: The standard configuration station would be moderate in cost if developed in conjunction with University and City of Merced planning and permitting processes.

Environmental: The University site would have no impacts on minority populations, low-income households, and cultural resources. The site would, however, affect residential areas, threatened and endangered species, and a considerable amount of farmlands, wetlands, and flood-prone areas.

S43 Merced Municipal Airport

Planning: The S43 Merced Municipal Airport site lies south and west of the SR99 Freeway. The site is large and open and has surrounding industrial uses. Development patterns in Merced are to the north of the city toward the new university area and in the opposite direction of this site.

Engineering: The site is accessible by high-speed alignments from all routes coming from the north. The SP and W99 routes are the only options to the south toward Fresno.

Cost: A four-track standard configuration station at this site would be moderate in cost.

Environmental: The Municipal Airport site is almost entirely devoted to farmland uses and lies within the 100-year floodplain. There are no scenic river crossings, wetlands, historic properties, or parklands in the station area. On the other hand, there is a sizable ethnic minority population (nearly 4,000 persons) and the station site affects two parks.

S44 Merced SP Downtown

Planning: The S44 Merced SP Downtown station site lies near the city center and is the transit hub of Merced on the SP route. The site has good connectivity to the SR 99 Freeway and is close to downtown destinations.

Engineering: The site can only be reached by station stopping tracks, with high-speed through service on the W99 alignment. The corridor is constrained by urban development and by existing rail freight uses. The local street grid crosses in several places. Grade separations would incur high costs and cause visual impacts in an aerial arrangement.

Cost: The station would incur relatively high capital costs, due to the denser urban uses in the urban core.

Environmental: The SP Downtown site has no wetlands, threatened and endangered species, or important farmlands. However, 45% of the site contains land uses that are considered incompatible and visually sensitive to a HSR station. The SP Downtown site is almost entirely in the 100-year floodplain and crosses scenic corridors or scenic rivers at 12 locations. In addition to having a significant number of ethnic minorities (about 14,600 persons), this site also contains historic properties (7) and 23 acres of parkland among 13 park and recreational areas.

S45 Merced Plainsburg









Planning: The S45 Merced Plainsburg site lies on the existing BNSF rail route at the edge of the rural center of Planada. The area is distant from the current and planned developed areas of metropolitan Merced.





















Engineering: The site lies at the joining point of the existing BNSF line and a conceptual E99 route from the University area. The site's chief advantage is its location on the existing rail line. The line would need to be realigned to allow high-speed running through the station area.

















Cost: A four-track standard configuration station would incur moderate costs.


Environmental: The Plainsburg site is largely farmland and 100-year floodplain. Despite the relatively low percentage of conflicting land uses (14%), there are about 2,500 ethnic minorities in the station area. There are no endangered species, cultural resources, or parklands in the area, but there is a small amount of wetlands.

Table 4.1.4C
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Merced Stations

Evaluation Criteria	Station S41 Merced Castle	Station S42 Merced University	Station S43 Merced Municipal Airport	Station S44 Merced SP Downtown
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Population/Employment Catchment				
				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	<ul style="list-style-type: none"> Suburban location for Merced, closer, to central Atwater. Freeway access: SR 99 ca 3 miles Arterial access: Santa Fe Avenue (J7), planned Bellevue Expressway, ca. 1 mile Parking adequate at site Transit bus and shuttle foreseeable in future No Amtrak connection 	<ul style="list-style-type: none"> Newsurban site in future University planned area. Freeway access: via planned expressway, about 3 miles Street access: New Bellevue expressway, in planning. Parking adequate in future design. Transit: feasible in future. Other rail: possible future LRT. 	<ul style="list-style-type: none"> Suburban location . Freeway access: SR 99 ca. 1 mile Street access: local streets only Parking adequate at location Transit: bus only Other rail: none 	<ul style="list-style-type: none"> Downtown location. Freeway access: SR 99 2 blocks Street access: local downtown grid Parking: may be constrained at site Transit: Hub for Merced County transit system Other rail: none
				
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Evaluation Criteria	Station S41 Merced Castle	Station S42 Merced University	Station S43 Merced Municipal Airport	Station S44 Merced SP Downtown
Operational Issues	High-speed track off BNSF or E99. Station can serve all alignments to south.	Newly designed high-speed track in new community.	High-speed track off SP or W99. Station can serve all alignments from north, SP or W99 alignments to south.	Constrained urban r-o-w. Stopping track configuration only. Freight compatibility issues.
				
Construction Issues	No outstanding issues. Must coordinate with airport and local authorities, including new UC campus.	Greenfield site.	No outstanding issues.	Urban r-o-w, Narrow freight corridor.
				
Capital Cost	Relatively low	Relatively low.	Relatively low.	Relatively high.
				
Right-of-Way Issues/Cost	Military base reuse. Land owned by local joint powers board.	Must assemble new route in newly zoned urban area.	Industrial area, Airport owned by city.	Existing r-o-w. Must acquire land to fit.
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	0.20	16.02	8.59	45.01
Primary Land Uses (acreage) within station area	Farmland/Agriculture (294); Transportation (207)	Farmland/Agriculture (421); Residential (75)	Farmland/Agriculture (443); Institutional (42)	Commercial (173); Residential (157)
				

Evaluation Criteria	Station S41 Merced Castle	Station S42 Merced University	Station S43 Merced Municipal Airport	Station S44 Merced SP Downtown
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	0.20	16.02	8.59	45.01
Number of scenic corridor and scenic river crossings	0	0	0	12
				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	0	1	0	0
Number of Wetland Crossings	1	4	0	0
Total Acreage of Wetlands within Station Area	0.48	44.59	0	0
				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	0	1	1	2
Total Acreage of FEMA Floodplain Crossings within Station Area	0	203.57	503.02	467.39
				
Threatened & Endangered Species Impacts				
Count of Species	0	2	1	1
Acreage of Sensitive Habitat within Station Area	30.53	0	0	0
				

Evaluation Criteria	Station S41 Merced Castle	Station S42 Merced University	Station S43 Merced Municipal Airport	Station S44 Merced SP Downtown
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	1963	0	3923	14635
Low Income Within 1,400' Buffer – 1990 Households	0	0	0	0
				
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	12.79	157.79	0	0
				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0	0	0	7
				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in Station Area	0	2	0	13
Count of Parks/Recreation Areas	0	1.16	0	23.19
				

Evaluation Criteria	Station S41 Merced Castle	Station S42 Merced University	Station S43 Merced Municipal Airport	Station S44 Merced SP Downtown
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				












Least Favorable

Most Favorable

Table 4.1.4C continued
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Merced Stations

Evaluation Criteria	Station S45 Merced Plainsburg			
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable			
Length	Not Applicable			
Population/Employment Catchment				
	1			
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	<ul style="list-style-type: none"> • Downtown site in small community. • Freeway access: distant • Street access: local roads • Parking: adequate at site • Transit: bus only • Other rail: no Amtrak connection. 			
	0			
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable			
Operational Issues	On existing BNSF line. High-speed track requires relaying curves in settled area.			
	1/4			

Evaluation Criteria	Station S45 Merced Plainsburg			
Construction Issues	Minimal.			
				
Capital Cost	Low			
				
Right-of-Way Issues/Cost	Moderate.			
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	14.33			
Primary Land Uses (acreage) within station area	Farmland/Agriculture (396)			
				
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	14.33			
Number of scenic corridor and scenic river crossings	0			
				

Evaluation Criteria	Station S45 Merced Plainsburg			
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	2			
Number of Wetland Crossings	2			
Total Acreage of Wetlands within Station Area	1.25			
				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	1			
Total Acreage of FEMA Floodplain Crossings within Station Area	428.71			
				
Threatened & Endangered Species Impacts				
Count of Species	0			
Acreage of Sensitive Habitat within Station Area	0			
				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	2500			
Low Income Within 1,400' Buffer – 1990 Households	0			
				

Evaluation Criteria	Station S45 Merced Plainsburg			
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	420.83			
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0			
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in Station Area	0			
Count of Parks/Recreation Areas	0			
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				

Evaluation Criteria	Station S45 Merced Plainsburg			
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				



D. ALIGNMENT SCREENING CONSIDERATIONS

Alignments along the four general routes approach the Merced area stations with no significant engineering or environmental challenges. The four routes are geographically closer to each other in Merced than at any other point in the entire Sacramento to Bakersfield region. This provides the opportunity to shift from one route to another to exploit relative advantages of alignments north and south of this point.

A high-speed alignment between the S41 Merced Castle and S43 Merced Airport sites accomplishes this changeover from the eastern routes (BNSF and E99) to the western routes (SP and W99). The alignment crosses a relatively undeveloped area that is also being planned for part of an expressway loop, or beltway, from the SR 99 Freeway to serve the new UC Merced campus and community.

A new E99 alignment to serve the S42 Merced University station site or the S45 Merced Plainsburg site would commit the high-speed route to the east side (BNSF or E99) up to a crossover point closer to Fresno, which is possible as part of the Fresno rail consolidation process. Both the alignment and the crossover would be longer in this scenario.

As in the Modesto segment, the alignments to the S44 Merced SP Downtown station site involve denser urban uses and higher construction costs on a two-track stopping track alignment. Nonstop high-speed service would require a separate through track alignment, most likely part of the W99 route.

The W99 alignment runs west of the metropolitan area in new territory.

The E 99 route merges with the BNSF route south of Merced and continues together to a point in Madera County, where the E99 veers to the east.

Overview of Environmental Impacts on the 25 Alignment Variations

25 alignment variations between Merced and Fresno were analyzed using the nine environmental evaluation criteria.

Two alignments exhibited the lowest level of impact in this segment. These are:

- A4552 Merced Plainsburg to Fresno Chandler Field, and
- A4556 Merced Plainsburg to Fresno West.

A third alignment exhibited somewhat more impacts, but was akin to the first two in overall impacts. This is:

- A4551 Merced Plainsburg to Fresno Downtown.

The three alignments exhibit similar low levels of impact for land use, visual, floodplains, and parks and recreation. These all exhibit intermediate levels of impact on water resources, and threatened and endangered species. The third alignment (A4551) has somewhat fewer farmland impacts, but greater cultural resource impacts than the first two alignments (A4552 and A4556).

























The alignment exhibiting the greatest level of impacts is:

















- A4155 Merced Castle to Fresno East.

While it had relatively low levels of impact on environmental justice and cultural resources, it has a high level of impact on water resources, threatened and endangered species, farmland, and parks and recreation. This alignment exhibited intermediate levels of impact on land use, visual, and floodplain resources.

Table 4.1.4D
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Merced to Fresno Alignment

Evaluation Criteria	Alignment A4151	Alignment A4152	Alignment A4153	Alignment A4155
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 21.21 minutes Mag 18.77 minutes	VHS 21.22 minutes Mag 18.78 minutes	VHS 16.41 minutes Mag 14.37 minutes	VHS 23.97 minutes Mag 21.30 minutes
Length	65.20 miles 104.93 km	65.23 miles 104.98 km	47.61 miles 76.62 km	75.32 miles 121.21 km
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Relatively direct	Relatively direct	Relatively direct	Longer, goes well to the east of direct route
Operational Issues	BNSF and UP freight coordination Amtrak coordination	BNSF freight coordination Amtrak coordination	BNSF freight coordination Amtrak coordination	BNSF and Amtrak coordination

Evaluation Criteria	Alignment A4151	Alignment A4152	Alignment A4153	Alignment A4155
Construction Issues	Part new alignment Part BNSF and UP coordination Downtown issues in Fresno	Part new alignment Part BNSF coordination	Part new alignment Part BNSF coordination Downtown issues in Fresno	New alignment/BNSF/New BNSF coordination
				
Capital Cost	High cost	Moderate to high cost	High cost	Moderate cost
				
Right-of-Way Issues/Cost	Fresno downtown high cost UP ROW New ROW and BNSF	New ROW and BNSF	Fresno downtown high cost New ROW and BNSF	New ROW and BNSF
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	16.80	16.41	25.11	23.10
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	2.00	2.00	2.00	2.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	23.00	23.00	23.00	34.00
Number of Wetland Crossings	19.00	20.00	20.00	28.00
Total Acreage of Wetlands Within ROW	77.62	78.24	77.78	82.75
RANKING				

Evaluation Criteria	Alignment A4151	Alignment A4152	Alignment A4153	Alignment A4155
Floodplain Impacts				
Number of FEMA Floodplain Crossings	18.00	17.00	20.00	14.00
Associated Length (meters) of Floodplain Crossings	15960.67	14671.16	15428.81	19050.25
Total Acreage of FEMA Floodplain Crossings	105.36	103.41	104.17	136.50
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	19.00	19.00	20.00	19.00
Count of Species along ROW	0.00	0.00	0.00	0.00
Sensitive Habitat Acreage w/in ROW	83.52	83.52	83.52	83.52
Net Sensitive Habitat Acreage along ROW	252.10	252.10	252.10	252.10
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	21326.00	14829.00	20469.00	9149.00
Low Income Within 1,400' Buffer – 1990 Households	45.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	325.28	396.37	319.78	501.10
RANKING				

















































Evaluation Criteria	Alignment A4151	Alignment A4152	Alignment A4153	Alignment A4155
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	1.00	0.00	0.00	0.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.00	0.00	4.16
Total Acreage of Parks/Recreation Areas along ROW	0.37	0.37	1.01	12.41
Incidences of Parks/Recreation Areas in ROW	0.00	0.00	0.00	2.00
Incidences of Parks/Recreation Areas along ROW	1.00	1.00	2.00	3.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.4D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Merced to Fresno Alignment

Evaluation Criteria	Alignment A4156	Alignment A4251	Alignment A4252	Alignment A4253
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 20.30 minutes Mag 17.94 minutes	VHS 19.34 minutes Mag 17.06 minutes	VHS 19.35 minutes Mag 17.07 minutes	VHS 14.54 minutes Mag 12.66 minutes
				
Length	61.87 miles 99.56 km	58.36 miles 93.92 km	58.38 miles 93.96 km	40.76 miles 65.60 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Relatively direct	Diverges easterly from direct line	Diverges easterly from direct line	Diverges easterly from direct line
				
Operational Issues	BNSF and Amtrak coordination	BNSF and Amtrak coordination UP coordination	BNSF and Amtrak coordination	BNSF and Amtrak coordination
				

Evaluation Criteria	Alignment A4156	Alignment A4251	Alignment A4252	Alignment A4253
Construction Issues	New alignments/BNSF/new BNSF coordination	New alignments/BNSF/new BNSF coordination UP coordination	New alignments/BNSF/new BNSF coordination	BNSF coordination Fresno downtown
				
Capital Cost	Moderate to high cost	High cost	Moderate to high cost	High cost
				
Right-of-Way Issues/Cost	New ROW/BNSF	Fresno downtown high cost UP ROW New ROW/BNSF	New ROW/BNSF	BNSF coordination Fresno downtown high cost
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	15.97	18.51	18.12	27.77
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	2.00	1.00	1.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	23.00	21.00	21.00	21.00
Number of Wetland Crossings	20.00	16.00	17.00	17.00
Total Acreage of Wetlands Within ROW	78.24	76.42	77.04	76.58
RANKING				

Evaluation Criteria	Alignment A4156	Alignment A4251	Alignment A4252	Alignment A4253
Floodplain Impacts				
Number of FEMA Floodplain Crossings	15.00	16.00	15.00	18.00
Associated Length (meters) of Floodplain Crossings	14367.98	14022.69	12733.18	13490.84
Total Acreage of FEMA Floodplain Crossings	101.24	90.79	88.85	89.60
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	18.00	18.00	18.00	19.00
Count of Species along ROW	0.00	0.00	0.00	0.00
Sensitive Habitat Acreage w/in ROW	83.52	83.52	83.52	83.52
Net Sensitive Habitat Acreage along ROW	252.10	251.55	251.55	251.55
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	13393.00	19363.00	12866.00	18506.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	45.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	380.61	293.42	364.51	287.92
RANKING				

































Evaluation Criteria	Alignment A4156	Alignment A4251	Alignment A4252	Alignment A4253
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	1.00	0.00	0.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.00	0.00	0.00
Total Acreage of Parks/Recreation Areas along ROW	0.37	0.37	0.37	1.01
Incidences of Parks/Recreation Areas in ROW	0.00	0.00	0.00	0.00
Incidences of Parks/Recreation Areas along ROW	1.00	1.00	1.00	2.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.4D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Merced to Fresno Alignment

Evaluation Criteria	Alignment A4255	Alignment A4256	Alignment A4351A	Alignment A4351B
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 22.10 minutes Mag 19.59 minutes	VHS 18.43 minutes Mag 16.23 minutes	VHS 18.68 minutes Mag 16.46 minutes	VHS 18.80 minutes Mag 16.56 minutes
Length	68.47 miles 110.19 km	55.02 miles 88.54 km	55.94 miles 90.03 km	56.36 miles 90.71 km
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Diverges easterly from direct line	Diverges easterly from direct line	Shorter and less costly of the two A4351 alternatives	Longer and more costly of the two A4351 alternatives
Operational Issues	BNSF and Amtrak coordination	BNSF and Amtrak coordination	SP coordination in Fresno	SP coordination full length

Evaluation Criteria	Alignment A4255	Alignment A4256	Alignment A4351A	Alignment A4351B
Construction Issues	BNSF coordination Fresno downtown	BNSF coordination Fresno downtown	SP coordination in Fresno Mainly new alignment	SP coordination full length SP alignment
				
Capital Cost	Moderate cost	Moderate to high cost	Moderate cost	High cost
				
Right-of-Way Issues/Cost	BNSF coordination Fresno downtown high cost	BNSF coordination Fresno downtown high cost	New ROW Fresno downtown high cost	SP ROW higher cost to develop per mile Fresno downtown high cost
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	25.26	17.73	21.84	13.79
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	1.00	0.00	0.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	32.00	21.00	13.00	15.00
Number of Wetland Crossings	25.00	17.00	20.00	9.00
Total Acreage of Wetlands Within ROW	81.55	77.04	28.30	6.82
RANKING				

Evaluation Criteria	Alignment A4255	Alignment A4256	Alignment A4351A	Alignment A4351B
Floodplain Impacts				
Number of FEMA Floodplain Crossings	12.00	13.00	15.00	14.00
Associated Length (meters) of Floodplain Crossings	17112.28	12430.00	28279.24	30725.41
Total Acreage of FEMA Floodplain Crossings	121.93	86.67	203.48	222.72
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	18.00	17.00	2.00	5.00
Count of Species along ROW	0.00	0.00	1.00	2.00
Sensitive Habitat Acreage w/in ROW	83.52	83.52	38.71	20.54
Net Sensitive Habitat Acreage along ROW	251.55	251.55	123.33	41.98
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	7186.00	11430.00	14435.00	29241.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	45.00	45.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	469.24	348.75	396.28	332.13
RANKING				

















































Evaluation Criteria	Alignment A4255	Alignment A4256	Alignment A4351A	Alignment A4351B
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	1.00	1.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	4.16	0.00	0.00	0.00
Total Acreage of Parks/Recreation Areas along ROW	12.41	0.37	0.00	0.00
Incidences of Parks/Recreation Areas in ROW	2.00	0.00	0.00	0.00
Incidences of Parks/Recreation Areas along ROW	3.00	1.00	0.00	0.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.4D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Merced to Fresno Alignment

Evaluation Criteria	Alignment A4352A	Alignment A4352B	Alignment A4451A	Alignment A4451B
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 18.43 minutes Mag 16.22 minutes	VHS 18.77 minutes Mag 16.54 minutes	VHS 18.74 minutes Mag 16.51 minutes	VHS 18.51 minutes Mag 16.30 minutes
				
Length	55.01 miles 88.53 km	56.28 miles 90.57 km	56.17 miles 90.40 km	55.30 miles 88.99 km
				
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Shorter and less costly of the two A4352 alternatives	Longer and more costly of the two A4352 alternatives	Longer but less costly of the two A4451 alternatives	Shorter but more costly of the two A4451 alternatives
				
Operational Issues	None. New alignment	SP coordination	SP coordination in Fresno and Merced downtown	SP coordination full length
				

Evaluation Criteria	Alignment A4352A	Alignment A4352B	Alignment A4451A	Alignment A4451B
Construction Issues	New alignment	SP coordination full length SP alignment	SP coordination in Fresno and Merced downtown Downtown Fresno and Merced	SP coordination full length Downtown Fresno and Merced
				
Capital Cost	Low cost	High cost	Moderate cost	High cost
				
Right-of-Way Issues/Cost	New ROW	SP ROW higher cost to develop per mile	SP coordination Merced and Fresno Downtown cost Merced and Fresno	SP coordination and cost full length
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	21.87	13.35	23.51	18.83
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	0.00	2.00	2.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	13.00	15.00	13.00	9.00
Number of Wetland Crossings	19.00	10.00	19.00	6.00
Total Acreage of Wetlands Within ROW	28.03	7.48	25.45	4.39
RANKING				

Evaluation Criteria	Alignment A4352A	Alignment A4352B	Alignment A4451A	Alignment A4451B
Floodplain Impacts				
Number of FEMA Floodplain Crossings	15.00	14.00	20.00	13.00
Associated Length (meters) of Floodplain Crossings	26855.37	29433.11	27035.09	20558.88
Total Acreage of FEMA Floodplain Crossings	199.15	220.73	185.09	138.01
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	2.00	5.00	3.00	2.00
Count of Species along ROW (Adjacent Buffer-ROW)	1.00	2.00	0.00	1.00
Sensitive Habitat Acreage (ROW)	38.71	20.54	38.24	0.00
Net Sensitive Habitat Acreage (Adjacent -ROW)	123.33	41.98	121.01	0.00
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	7938.00	22744.00	18298.00	22376.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	209.00	209.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	437.98	399.68	372.24	117.18
RANKING				

















































Evaluation Criteria	Alignment A4352A	Alignment A4352B	Alignment A4451A	Alignment A4451B
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	2.00	2.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.00	0.00	0.00
Total Acreage of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
Incidences of Parks/Recreation Areas in ROW	0.00	0.00	0.00	0.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.4D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Merced to Fresno Alignment

Evaluation Criteria	Alignment A4452A	Alignment A4452B	Alignment A4456A	Alignment A4456B
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 18.49 minutes Mag 16.28 minutes	VHS 18.48 minutes Mag 16.27 minutes	VHS 17.57 minutes Mag 15.44 minutes	VHS 17.57 minutes Mag 15.43 minutes
Length	55.24 miles 88.90 km	55.21 miles 88.85 km	51.87 miles 83.48 km	51.85 miles 83.44 km
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Less costly of the two A4452 alternatives	More costly of the two A4452 alternatives	Less costly of the two A4456 alternatives	More costly of the two A4456 alternatives
Operational Issues	SP coordination Merced downtown	SP coordination full length	New alignment SP Merced	SP coordination

Evaluation Criteria	Alignment A4452A	Alignment A4452B	Alignment A4456A	Alignment A4456B
Construction Issues	SP coordination Merced Downtown Merced	SP coordination Merced to Fresno north. Downtown Merced	Merced downtown	SP coordination full length to Fresno north Merced downtown
				
Capital Cost	Moderate to low cost	High cost	Low cost	High cost
				
Right-of-Way Issues/Cost	SP coordination Merced Downtown cost Merced	SP coordination and cost Merced to Fresno north	Merced downtown New ROW	Merced downtown SP ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	23.59	14.90	23.57	14.27
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	2.00	2.00	2.00	2.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	13.00	14.00	13.00	14.00
Number of Wetland Crossings	18.00	9.00	18.00	9.00
Total Acreage of Wetlands Within ROW	25.18	6.30	25.18	6.30
RANKING				

Evaluation Criteria	Alignment A4452A	Alignment A4452B	Alignment A4456A	Alignment A4456B
Floodplain Impacts				
Number of FEMA Floodplain Crossings	20.00	9.00	18.00	7.00
Associated Length (meters) of Floodplain Crossings	25611.22	26100.02	25308.03	25796.84
Total Acreage of FEMA Floodplain Crossings	180.76	186.65	178.59	184.48
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	3.00	6.00	2.00	5.00
Count of Species along ROW (Adjacent Buffer-ROW)	0.00	1.00	0.00	1.00
Sensitive Habitat Acreage (ROW)	38.24	20.54	38.24	20.54
Net Sensitive Habitat Acreage (Adjacent -ROW)	121.01	41.98	121.01	41.98
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	11801.00	26607.00	10365.00	25171.00
Low Income Within 1,400' Buffer – 1990 Households	164.00	164.00	164.00	164.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	413.94	355.87	398.17	340.11
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along	1.00	1.00	1.00	1.00

















































Evaluation Criteria	Alignment A4452A	Alignment A4452B	Alignment A4456A	Alignment A4456B
ROW RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.00	0.00	0.00
Total Acreage of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
Incidences of Parks/Recreation Areas in ROW	0.00	0.00	0.00	0.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.4D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Merced to Fresno Alignment

Evaluation Criteria	Alignment A4551	Alignment A4552	Alignment A4553	Alignment A4555
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 16.42 minutes Mag 14.39 minutes	VHS 16.43 minutes Mag 14.39 minutes	VHS 11.62 minutes Mag 9.99 minutes	VHS 19.18 minutes Mag 16.91 minutes
Length	47.66 miles 76.70 km	47.68 miles 76.74 km	30.06 miles 48.38 km	57.77 miles 92.97 km
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	Diverges easterly from direct line	Diverges easterly from direct line	High cost per mile Diverges easterly from direct line	Diverges easterly from direct line
Operational Issues	SP and BNSF coordination	BNSF coordination	BNSF and Amtrak coordination	BNSF and Amtrak coordination

Evaluation Criteria	Alignment A4551	Alignment A4552	Alignment A4553	Alignment A4555
Construction Issues	SP and BNSF coordination Downtown Fresno	BNSF coordination	BNSF ROW Downtown Fresno	BNSF ROW
				
Capital Cost	High cost	Moderate to high cost	High cost	Moderate cost
				
Right-of-Way Issues/Cost	Downtown Fresno	BNSF ROW	BNSF ROW Downtown Fresno	BNSF ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	19.70	18.85	30.94	27.55
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	0.00	0.00	0.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	17.00	17.00	17.00	28.00
Number of Wetland Crossings	11.00	12.00	12.00	20.00
Total Acreage of Wetlands Within ROW	35.66	36.28	35.81	40.79
RANKING				

Evaluation Criteria	Alignment A4551	Alignment A4552	Alignment A4553	Alignment A4555
Floodplain Impacts				
Number of FEMA Floodplain Crossings	14.00	13.00	16.00	10.00
Associated Length (meters) of Floodplain Crossings	11126.87	9837.36	10595.02	14216.46
Total Acreage of FEMA Floodplain Crossings	71.73	69.79	70.54	102.87
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	6.00	6.00	7.00	6.00
Count of Species along ROW (Adjacent Buffer-ROW)	0.00	0.00	0.00	0.00
Sensitive Habitat Acreage (ROW)	49.89	49.89	49.89	49.89
Net Sensitive Habitat Acreage (Adjacent -ROW)	150.71	150.71	150.71	150.71
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	16087.00	8978.00	15230.00	3910.00
Low Income Within 1,400' Buffer – 1990 Households	45.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	242.09	271.60	236.58	417.90
RANKING				





















Evaluation Criteria	Alignment A4551	Alignment A4552	Alignment A4553	Alignment A4555
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	1.00	0.00	0.00	0.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.00	0.00	4.16
Total Acreage of Parks/Recreation Areas along ROW	0.00	0.00	0.64	12.04
Incidences of Parks/Recreation Areas in ROW	0.00	0.00	0.00	2.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	1.00	2.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				






Table 4.1.4D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Merced to Fresno Alignment

Evaluation Criteria	Alignment A4556			
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 15.51 minutes Mag 13.55 minutes			
	●			
Length	44.32 miles 71.32 km			
	●			
Population/Employment Catchment	Not Applicable			
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable			
<i>Minimize Operating and Capital Costs.</i>				
Length	Meanders, hence longer			
	○			
Operational Issues	BNSF and Amtrak coordination			
	●			

Evaluation Criteria	Alignment A4556			
Construction Issues	BNSF ROW			
				
Capital Cost	Moderate to high cost			
				
Right-of-Way Issues/Cost	BNSF ROW			
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	18.87			
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00			
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	17.00			
Number of Wetland Crossings	12.00			
Total Acreage of Wetlands Within ROW	36.28			
RANKING				

Evaluation Criteria	Alignment A4556			
Floodplain Impacts				
Number of FEMA Floodplain Crossings	11.00			
Associated Length (meters) of Floodplain Crossings	9534.18			
Total Acreage of FEMA Floodplain Crossings	67.61			
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	5.00			
Count of Species along ROW (Adjacent Buffer-ROW)	0.00			
Sensitive Habitat Acreage (ROW)	49.89			
Net Sensitive Habitat Acreage (Adjacent -ROW)	150.71			
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	8154.00			
Low Income Within 1,400' Buffer – 1990 Households	0.00			
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	297.41			
RANKING				

Evaluation Criteria	Alignment A4556			
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00			
Number of National Register Resources along ROW	0.00			
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00			
Total Acreage of Parks/Recreation Areas along ROW	0.00			
Incidences of Parks/Recreation Areas in ROW	0.00			
Incidences of Parks/Recreation Areas along ROW	0.00			
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Least Favorable Most Favorable

4.1.5 Fresno to Tulare Segment

This segment operates from station sites in Fresno to the next station sites in Tulare County or Kings County. In the Fresno area, six station sites have been evaluated, of which four have been linked to feasible alignments. Three stations on the west side of Fresno are accessible from the W99, SP or BNSF alignment routes. These alignments continue south of Fresno toward Tulare County and Kings County. An outlying station on the E99 alignment would serve Fresno from an eastern conceptual freeway route, separate from the other alignments. All four alignments have no more crossover points before the Bakersfield area, 100 miles to the south.

A. THE FRESNO STATION SITES ARE:

S51 Fresno Downtown

This site is located within the SP right-of-way in downtown Fresno, which lies between parallel Highway 99 on the west and the downtown street grid on the east. The original SP depot at Fresno Street has been reused for other purposes, but a long band of land along the existing Union Pacific track and operating property, north or south of this site, is available for the high-speed station area. The station can be located along this strip according to the planning goals of the community and in the context of the BNSF/UP rail consolidation process.

S52 Fresno Chandler Field

This site is located west of downtown on the property of Chandler Field, a general aviation airport with industrial uses and zoning in the vicinity. The station would be served by a new stopping track alignment through the site or along its perimeter.

S53 Fresno BNSF Amtrak

This site is the existing Amtrak station along the BNSF right-of-way. The station is on Tulare Street near the Fresno City Hall. The BNSF right-of-way through the downtown area is slated to be decommissioned in a rail consolidation with the UP (SP), and the present station site would not accommodate a high-speed rail facility of the dimensions that will be required for expected Fresno ridership.

S54 Fresno Airport

The site is located at the Fresno Yosemite International Airport, formerly Fresno Air Terminal. The station would be located along the perimeter of the airport in the vicinity of Clovis Avenue. The exact location and orientation of the station would depend on aviation requirements in the area. Since the E99 alignment has been shifted to the east of this area to the conceptual alignment of a new 65 Freeway, this site will not be carried forward as a feasible high-speed rail station.

S55 Fresno East

This site is located along a conceptual freeway route in the eastern San Joaquin Valley. It would be a standard configuration station located near the junction of the E99 alignment and SR 180 east of Fresno.

S56 Fresno West

This site is located in the western suburban area of Fresno along the W99 alignment. The standard configuration station would be located near the junction of the W99 alignment and SR 180 west of Fresno.

California High Speed Rail Project

RESNO TO TULARE, CA

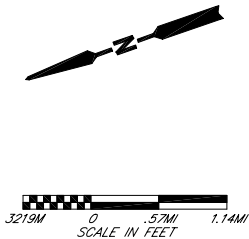
Alignment Options

June 04, 2001



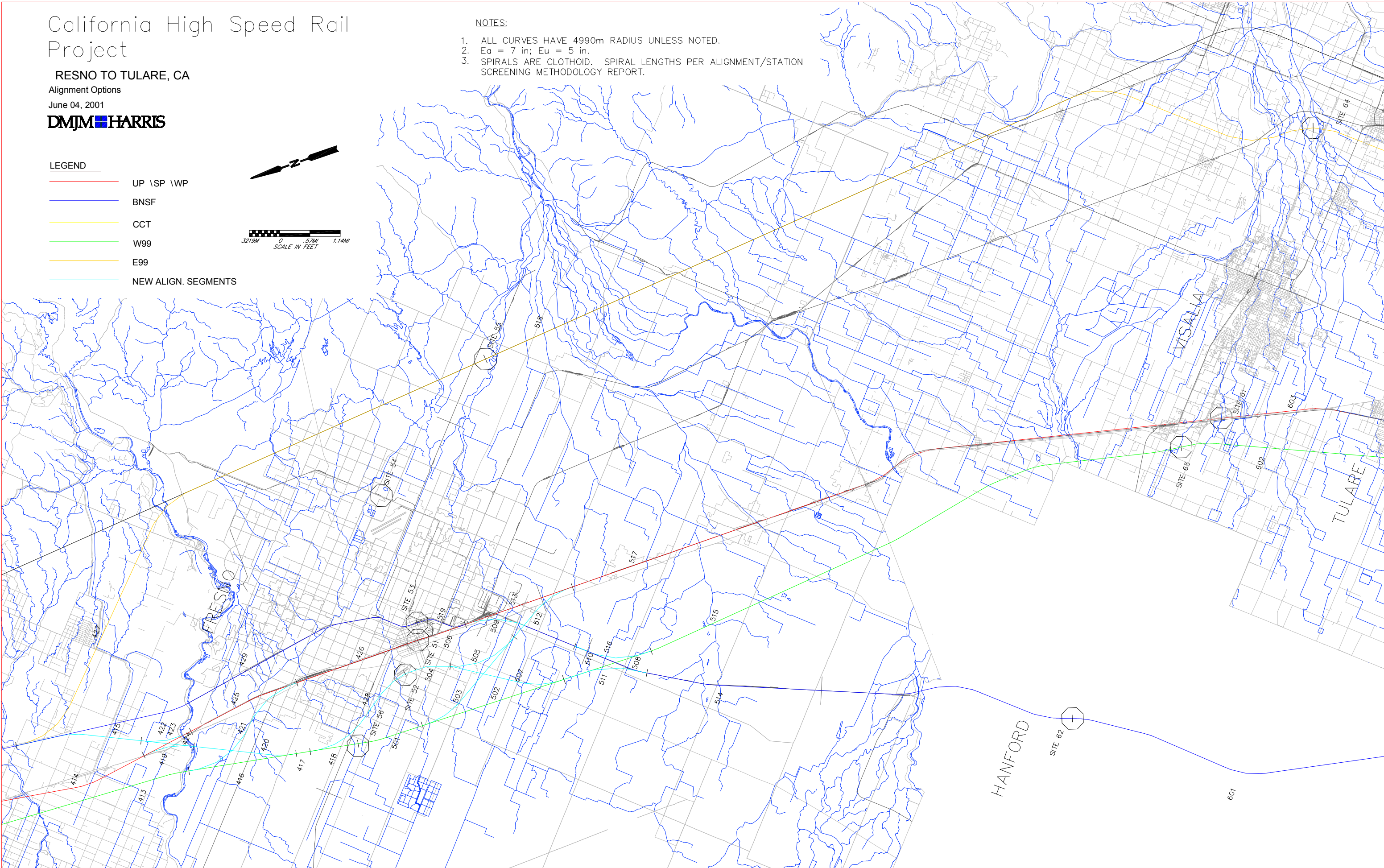
LEGEND

- UP \ SP \ WP
- BNSF
- CCT
- W99
- E99
- NEW ALIGN. SEGMENTS



NOTES:

1. ALL CURVES HAVE 4990m RADIUS UNLESS NOTED.
2. Ea = 7 in; Eu = 5 in.
3. SPIRALS ARE CLOTHOID. SPIRAL LENGTHS PER ALIGNMENT/STATION SCREENING METHODOLOGY REPORT.



B. THE FRESNO ALIGNMENT GROUPINGS ARE:

Leaving Fresno, all four major alignments, that is, the BNSF, W99, SP and E99, are available for further travel south toward Tulare and Bakersfield. The first three of these can be served from the downtown and west side stations in Fresno, but the E99 can only be served from the associated S55 Fresno East station.

Station S51 Fresno Downtown is reached by a stopping track along the SP route via Line Segments 425 and 426. It rejoins the SP route as a high-speed alignment via Line Segments 506 and 513. Depending on the joint requirements of a possible rail consolidation project along the SP corridor, it may be possible to locate a full four-track high-speed configuration in the downtown right-of-way. Tracks to the W99 route follow Line Segments 506, 509, 516 and 515. A BNSF connection to the west involves Line Segments 506, 509, 510 and 514.

Station S52 Chandler Field is connected to all routes by a new stopping track system consisting of Line Segments 428, 504, 505 with 512 or 507 with 511.

Station S56 Fresno West is designed as a suburban station serving the high-speed W99 alignment. A high-speed connection from the W99 to the SP route using Line Segments 501, 503 and 512 is also possible. These segments, without the S56 Fresno West station, would also be part of an express through route for non-stopping trains around S51 Fresno Downtown (along with Line Segments 419, 420, 417 and 418).

Station S55 Fresno East is served by the E99 route only via Line Segment 518.

Fresno Stations Track Alignments

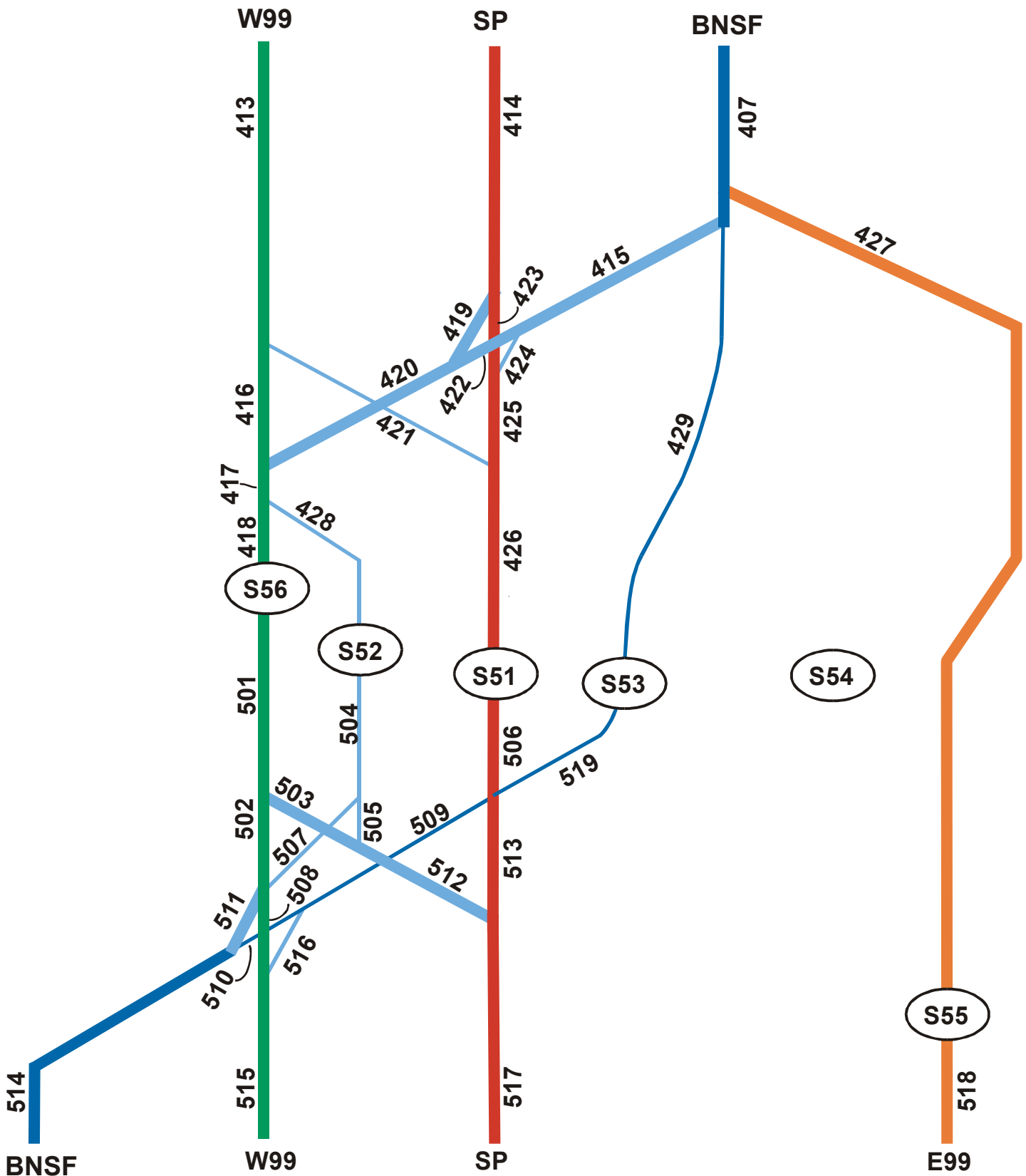


Figure 4.1.5B

Segment 5
Fresno to Tulare
Station to Station Alignments

Alignment #	Stations	Line Segments	Associated Through Line Segments
A5161	S51 Fresno Downtown to S61 Visalia Airport	506, 513, 517	501, 503, 512
A5162	S51 Fresno Downtown to S62 Hanford	506, 509, 510, 514	501, 502, 511
A5163	S51 Fresno Downtown to S63 Tulare Airport	506, 513, 517, 603	501, 503, 512
A5164	S51 Fresno Downtown to S64 Tulare East County	Not Applicable	
A5165	S51 Fresno Downtown to S65 Tulare West County	506, 509, 516, 515	501, 502, 508
A5261	S52 Fresno Chandler Field to S61 Visalia Airport	504, 505, 512, 517	501, 503
A5262	S52 Fresno Chandler Field to S62 Hanford	504, 507, 511, 514	501, 502
A5263	S52 Fresno Chandler Field to S63 Tulare Airport	504, 505, 512, 517, 603	501, 503
A5264	S52 Fresno Chandler Field to S64 Tulare East County	Not Applicable	
A5265	S52 Fresno Chandler Field to S65 Tulare West County	Not Applicable	
A5361	S53 Fresno BNSF Amtrak to S61 Visalia Airport	519, 513, 517	501, 503, 512
A5362	S53 Fresno BNSF Amtrak to S62 Hanford	519, 509, 510, 514	501, 502, 511
A5363	S53 Fresno BNSF Amtrak to S63 Tulare Airport	519, 513, 517, 603	501, 503, 512
A5364	S53 Fresno BNSF Amtrak to S64 Tulare East County	Not Applicable	
A5365	S53 Fresno BNSF Amtrak to S65 Tulare West County	Not Applicable	
A5461	S54 Fresno Airport to S61 Visalia Airport	Not Applicable	
A5462	S54 Fresno Airport to S62 Hanford	Not Applicable	
A5463	S54 Fresno Airport to S63 Tulare Airport	Not Applicable	
A5464	S54 Fresno Airport to S64 Tulare East County	Not Applicable	
A5465	S54 Fresno Airport to S65 Tulare West County	Not Applicable	
A5561	S55 Fresno East to S61 Visalia Airport	Not Applicable	
A5562	S55 Fresno East to S62 Hanford	Not Applicable	
A5563	S55 Fresno East to S63 Tulare Airport	Not Applicable	
A5564	S55 Fresno East to S64 Tulare East County	518	N/A
A5565	S55 Fresno East to S65 Tulare West County	Not Applicable	
A5661	S56 Fresno West to S61 Visalia Airport	501, 503, 512, 517	N/A
A5662	S56 Fresno West to S62 Hanford	501, 502, 511, 514	N/A
A5663	S56 Fresno West to S63 Tulare Airport	501, 503, 512, 517, 603	N/A
A5664	S56 Fresno West to S64 Tulare East County	Not Applicable	
A5665	S56 Fresno West to S65 Tulare West County	501, 502, 508, 515	N/A

C. STATION SCREENING CONSIDERATIONS

S51 Fresno Downtown

Planning: The station site is closest to downtown Fresno and the "Triangle," formed by the 99, 41 and 180 Freeways, which is the central city focus area for economic development planning. The SP alignment through the area is the preferred route for UP and BNSF rail consolidation in the Fresno area. Parking and ancillary services will require considerable area for the passenger volumes expected. Interchange with Amtrak San Joaquin service will increase coverage for both systems.

Engineering: The SP alignment area is a broad band through the area, wider in former freight yard areas. Actual usable area for HSR station track will depend on the configuration and design standards of the consolidated freight corridor. It is assumed that high-speed trains can operate through the area at full speed in the standard 4-track station configuration. If space does not permit this, two stopping tracks could serve the station, with through tracks west of the city on the W99 alignment.

Cost: Higher costs are expected, due to integration into urban core and proximity to existing railroad facilities and customer sidings.

Environmental: The Downtown site would have few to no impacts on water resources (wetlands and natural streams), threatened and endangered species, and important farmlands. However, the site contains a large ethnic minority population (about 7,400 persons), five historic properties, and one park. Approximately half of the station area lies within the 100-year floodplain.

S52 Fresno Chandler Field

Planning: The S52 Chandler Field site is a large open area used as a general aviation airport. New industrial areas are close by, as are large residential neighborhoods. The site is west of the SP route and the SR 99 Freeway, but close enough to the center of the city to be considered a quasi-downtown site.

Engineering: The Chandler Field site is not connected by rail to the SP route. A station here would be on a stopping track loop from the W99 new alignment farther west of the city. The two through route tracks would still be required on the W99 alignment in addition to the two station tracks at Chandler Field.

Cost: The station would have moderate costs.

Environmental: The Chandler Field site has no threatened and endangered species or cultural resources. From a land use and visual perspective, half the station area contains supportive industrial and transportation uses, and half of the area contains conflicting residential uses. The Chandler Field site would affect wetlands, minority populations, and four parks covering about 6 acres.

S53 Fresno BNSF Amtrak

Planning: The current Amtrak station is slated for decommissioning in the Fresno rail consolidation process.

Engineering: The BNSF main line through the station area is narrow and crosses many city streets. The line is considered substandard for existing freight and passenger uses and could not be easily upgraded for high-speed use.

Environmental: This site has no threatened and endangered species, or important farmlands. In terms of land use and socioeconomics, the BNSF Amtrak site, 45% of the land uses in the area are incompatible and visually sensitive to a HSR station. The site contains a significant ethnic community (about 8,900 persons), a large number of historic properties (11), and parklands (4 acres).

S54 Fresno Airport

Planning: An earlier conceptual E99 alignment included the existing Fresno Yosemite International Airport. The updated E99 alignment is based on early planning by Caltrans for a SR 65 eastern valley freeway alignment east of Fresno. The airport is east and north of downtown Fresno and is not connected directly to the expanded freeway system in place.

Engineering: A suitable rail alignment that meets high-speed performance criteria that would connect the Fresno Airport site to other alignments north and south of Fresno could not be found.

Environmental: The Airport site has no threatened and endangered species, important farmlands, or cultural resources. In contrast, 71% of the station area are land uses that are incompatible or visually sensitive to a HSR station. The station area contains one park, about 8 acres in the 100-year floodplain, and 3 acres of wetlands.

S55 Fresno East

Planning: The S55 Fresno East station site is a conceptual point on an east valley freeway alignment where the E99 alignment crosses SR 180. It is considerably east of current and planned development for Fresno and Clovis in agricultural land.

Engineering: The station site is not yet fixed, pending a more exact definition of the corridor. The station would be in the standard four-track configuration.

Cost: The standard station configuration in a greenfield setting will be moderate in cost.

Environmental: The Fresno East site has no sensitive residential land uses, scenic corridors or river crossings, threatened and endangered species, or environmental justice communities. On the other hand, the site contains significant agricultural resources and wetlands. Nearly a fourth of the site lies in the 100-year floodplain.

S56 Fresno West









Planning: The S56 Fresno West station is a conceptual point where the W99 route crosses SR 180. The site would be considered a suburban location, although currently in agricultural use. Fresno's development is moving to the north and east, which is away from this site.





















Engineering: The station would be in the standard four-track configuration.



Cost: The standard station configuration in a greenfield setting will be moderate in cost.

Environmental: The Fresno West site poses no or little constraints in terms of visual quality, natural resources, environmental justice, cultural resources, or parkland considerations. However, this site is almost entirely within farmlands of prime, unique, or statewide importance.

Table 4.1.5C
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Fresno Stations

Evaluation Criteria	Station S51 Fresno Downtown	Station S52 Fresno Chandler Field	Station S53 Fresno BNSF Amtrak	Station S54 Fresno Airport
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Population/Employment Catchment				
				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	<ul style="list-style-type: none"> Downtown location. Freeway access: Good access to SR 99 at several exits. Street access: downtown street grid Parking: may be limited at site Transit: good connections Amtrak connection with rail consolidation 	<ul style="list-style-type: none"> Almost downtown location. Freeway access: Good via SR 99 and SR 180 Street access: Limited local streets Parking adequate at site. Transit: bus only Other rail: nen 	<ul style="list-style-type: none"> Downtown location. Freeway access: ca. 1 mile to SR 99 Street access: downtown street grid Parking: very limited Transit: buses only Other rail: Current Amtrak station, to be decommissioned after rail consolidation 	<ul style="list-style-type: none"> Suburban location. Freeway access: SR 180 2 miles, SR 168 about 3 miles Street access: Arterial streets Parking adequate at shared airport facilities. Transit: Airport transit only Other rail: none
				
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Evaluation Criteria	Station S51 Fresno Downtown	Station S52 Fresno Chandler Field	Station S53 Fresno BNSF Amtrak	Station S54 Fresno Airport
Operational Issues	Freight rail consolidation may preempt use of some of corridor, limiting space for 4-track HSR station Transfer and interface with Amtrak. Normal interaction with freight RRs.	No major issues. Would be stopping track off new W99 alignment.	Numerous local crossings and slow-speed curves on BNSF line.	No right-of-way feasible to site.
				
Construction Issues	Possible narrow corridor for station with most expansive freight RR consolidation.	Normal aviation coordination required.	Constrained urban site.	Aviation coordination required.
				
Capital Cost	Relatively high.	Relatively low.	Relatively high because of urban site.	Not assessed. Relatively low.
				
Right-of-Way Issues/Cost	Availability of r-o-w interdependent with agreement with freight RRs on consolidation. Some city help with acquisition possible.	Assembly of entire new r-o-w required.	Constrained BNSF main line, to be taken out of service as result of rail consolidation.	No rail access possible.
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	22.78	48.44	45.30	71.01
Primary Land Uses (acreage) within station area	Commercial (158); Industrial (149); Mixed Use (53); Residential (47)	Industrial (44); Residential (184); Transportation (174)	Commercial (102); Industrial (94); Institutional (84); Residential (118)	Industrial (73); Mixed Use (48); Open Space (86); Residential (245)
RANKING				

Evaluation Criteria	Station S51 Fresno Downtown	Station S52 Fresno Chandler Field	Station S53 Fresno BNSF Amtrak	Station S54 Fresno Airport
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	22.78	48.44	45.30	71.01
Number of scenic corridor and scenic river crossings	0	0	0	0
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	0	0	0	0
Number of Wetland Crossings	1	1	1	3
Total Acreage of Wetlands within Station Area	1.22	7.13	2.08	2.95
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	1	0	1	1
Total Acreage of FEMA Floodplain Crossings within Station Area	265.83	0	235.82	8.02
RANKING				
Threatened & Endangered Species Impacts				
Count of Species	0	0	0	0
Acreage of Sensitive Habitat within Station Area	0	0	0	0
RANKING				

Evaluation Criteria	Station S51 Fresno Downtown	Station S52 Fresno Chandler Field	Station S53 Fresno BNSF Amtrak	Station S54 Fresno Airport
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	7358	6368	8893	1139
Low Income Within 1,400' Buffer – 1990 Households	351	0	474	0
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	0	8.40	0	0
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	5	0	11	0
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in Station Area	1	4	2	1
Count of Parks/Recreation Areas	0.38	5.77	4.34	4.40
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				







Evaluation Criteria	Station S51 Fresno Downtown	Station S52 Fresno Chandler Field	Station S53 Fresno BNSF Amtrak	Station S54 Fresno Airport
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				






























 Least Favorable Most Favorable

Table 4.1.5C continued
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Fresno Stations

Evaluation Criteria	Station S55 Fresno East	Station S56 Fresno West		
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable	Not Applicable		
Length	Not Applicable	Not Applicable		
Population/Employment Catchment				
				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Exurban site. Freeway access: Close to conceptual SR 65 freeway in future. Arterial access via SR 168. No transit access.	Suburban site. Freeway access: distant from SR 99. Arterial access via SR 180 No transit access.		
				
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable	Not Applicable		
Operational Issues	New greenfields site. No major issues, except landside distance from urban area.	New greenfields site.		
				

Evaluation Criteria	Station S55 Fresno East	Station S56 Fresno West		
Construction Issues	New greenfields site. No major issues.	New greenfields site.		
				
Capital Cost	Low	Relatively low.		
				
Right-of-Way Issues/Cost	Open agricultural land on new alignment of freeway.	Open agricultural land on new alignment.		
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	0	0		
Primary Land Uses (acreage) within station area	Farmlands/Agriculture (503.02)	Farmlands/Agriculture (503.02)		
RANKING				
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	0	0		
Number of scenic corridor and scenic river crossings	0	0		
RANKING				

Evaluation Criteria	Station S55 Fresno East	Station S56 Fresno West		
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	1	0		
Number of Wetland Crossings	4	1		
Total Acreage of Wetlands within Station Area	11.76	0.41		
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	2	0		
Total Acreage of FEMA Floodplain Crossings within Station Area	123.45	0		
RANKING				
Threatened & Endangered Species Impacts				
Count of Species	0	0		
Acreage of Sensitive Habitat within Station Area	0	0		
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	0	0		
Low Income Within 1,400' Buffer – 1990 Households	0	0		
RANKING				

Evaluation Criteria	Station S55 Fresno East	Station S56 Fresno West		
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	153.17	485.1		
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0	0		
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in Station Area	0	0		
Count of Parks/Recreation Areas	0	0		
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				

Evaluation Criteria	Station S55 Fresno East	Station S56 Fresno West		
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				



D. ALIGNMENT SCREENING CONSIDERATIONS

The northern approaches to the Fresno area cover all four of the major routes. However, the consolidated freight rail process for Fresno is expected to concentrate all BNSF and UP traffic on separate but co-located tracks on the SP alignment. The final configuration of the new freight (and Amtrak) tracks has not been determined, but may be from two to four main tracks with separate dispatching for each railroad. The high-speed train alignments must take account of this process in locating in the Fresno area. A high-speed route can also cross from eastern to western alignments at the same point as the consolidated rail corridor, if it had not done so already in Merced.

The feasibility of a four-track high-speed alignment at the S51 Fresno Downtown station site would depend on the final configuration of a consolidated rail corridor. Alternatively a two-track stopping track alignment with a through route on the W99 alignment would accommodate a downtown station.

A four-track suburban station on the W99 alignment would avoid the consolidated freight route completely.

The E99 alignment would serve Fresno from the eastern edge of the Metropolitan area. The E99 alignment, as conceived as a new freeway alignment, precludes the line from reaching the S54 Fresno Yosemite International Airport station site.

Similarly, the rail consolidation process would remove the S53 Fresno BNSF Amtrak site from consideration.

An alignment to the S52 Fresno Chandler Field site would be a two-track stopping track alignment approached from either the SP or W99 high-speed route. The new alignment can be connected to either of these routes to the south as well. This close-to-downtown site would require new alignment through relatively urban areas.

Overview of Environmental Impacts on the 15 Alignment Variations

Alignment variations between Fresno and Tulare were analyzed using the nine environmental evaluation criteria.

Two alignments exhibited the lowest level of impact in this segment. These are:

- A5165 Fresno Downtown to Tulare West County, and
- A5362 Fresno BNSF Amtrak to Hanford.

A5165 exhibited a high level of impacts on water resources and farmland, but a low level of impact on all other categories. A5362 was similar to A5165 in most categories, but exhibited a greater level of impact to land use and parks and recreation and relatively fewer impacts to water resources.

Two other alignments exhibited somewhat more impacts, but were akin to the first two in overall impacts. These are:

- A5662 Fresno East to Hanford, and
- A5665 Fresno west to Tulare East County.

Both of these alignments have higher levels of impact to farmland than the first two alignments. A5662 has a somewhat higher level of impact on land use. It has an intermediate level of impact on parks and recreation. By comparison, A5666 has a high level of impact on water resources.

























The alignment exhibiting the greatest level of impacts is:

















- A5363 Fresno BNSF Amtrak to Tulare Airport.

While it had relatively low levels of impact on visual, threatened and endangered species, farmland, and cultural resources, it has a high level of impact on water resources, floodplains and environmental justice. This alignment exhibited intermediate levels of impact on land use and parks and recreation.

Table 4.1.5D
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Fresno to Tulare Alignment









Evaluation Criteria	Alignment A5161	Alignment A5162	Alignment A5163	Alignment A5165
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 13.24 minutes Mag 11.47 minutes	VHS 11.29 minutes Mag 9.68 minutes	VHS 16.42 minutes Mag 14.38 minutes	VHS 12.97 minutes Mag 11.22 minutes
	N/A	N/A	N/A	N/A
Length	35.98 miles 57.90 km	28.85 miles 46.43 km	47.63 miles 76.65 km	34.99 miles 56.32 km
	N/A	N/A	N/A	N/A
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	UP coordination	BNSF and Amtrak coordination	UP coordination	UP coordination
	●	●	●	●
Operational Issues	UP coordination	BNSF and Amtrak coordination	UP coordination	UP coordination
	●	●	●	●

























Evaluation Criteria	Alignment A5161	Alignment A5162	Alignment A5163	Alignment A5165
Construction Issues	Fresno downtown UP coordination	Fresno downtown BNSF and Amtrak coordination	Fresno downtown UP coordination	Fresno downtown UP coordination
				
Capital Cost	High cost because of Fresno downtown and UP	Moderate to high cost because of Fresno Downtown but BN less costly	High cost because of Fresno downtown	Low cost
				
Right-of-Way Issues/Cost	Fresno downtown UP ROW High cost per mile	Fresno downtown BNSF and Amtrak ROW	Fresno downtown UP ROW High cost per mile	Fresno downtown UP ROW Low cost per mile
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	6.07	12.63	9.00	0.82
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	0.00	1.00	0.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	10.00	6.00	12.00	4.00
Number of Wetland Crossings	7.00	3.00	8.00	8.00
Total Acreage of Wetlands Within ROW	17.50	1.52	17.60	19.73
RANKING				

















Evaluation Criteria	Alignment A5161	Alignment A5162	Alignment A5163	Alignment A5165
Floodplain Impacts				
Number of FEMA Floodplain Crossings	8.00	5.00	10.00	9.00
Associated Length (meters) of Floodplain Crossings	12348.78	1644.41	12437.76	4347.91
Total Acreage of FEMA Floodplain Crossings	87.51	7.50	88.09	28.05
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	4.00	3.00	5.00	3.00
Count of Species along ROW	0.00	0.00	0.00	0.00
Sensitive Habitat Acreage w/in ROW	12.89	0.00	12.89	11.70
Net Sensitive Habitat Acreage along ROW	38.74	0.00	38.74	35.10
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	21555.00	8786.00	26220.00	9473.00
Low Income Within 1,400' Buffer – 1990 Households	158.00	158.00	158.00	158.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	47.38	255.17	47.38	244.10
RANKING				

Evaluation Criteria	Alignment A5161	Alignment A5162	Alignment A5163	Alignment A5165
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.60	0.00	0.00
Total Acreage of Parks/Recreation Areas along ROW	2.32	2.75	2.32	0.00
Incidences of Parks/Recreation Areas in ROW	0.00	1.00	0.00	0.00
Incidences of Parks/Recreation Areas along ROW	1.00	0.00	1.00	0.00
RANKING	◐	◐	◐	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.5D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Fresno to Tulare Alignment

Evaluation Criteria	Alignment A5261	Alignment A5262	Alignment A5263	Alignment A5361
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 13.71 minutes Mag 11.90 minutes	VHS 11.43 minutes Mag 9.81 minutes	VHS 16.89 minutes Mag 14.81 minutes	VHS 13.32 minutes Mag 11.54 minutes
	N/A	N/A	N/A	N/A
Length	37.71 miles 60.69 km	29.36 miles 47.25 km	49.36 miles 79.44 km	36.26 miles 58.36 km
	N/A	N/A	N/A	N/A
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	UP coordination	BNSF coordination	UP coordination	BNSF and UP coordination
				
Operational Issues	UP coordination	BNSF coordination	UP coordination	BNSF and UP coordination
				

Evaluation Criteria	Alignment A5261	Alignment A5262	Alignment A5263	Alignment A5361
Construction Issues	UP ROW	BNSF ROW	UP ROW	BNSF and UP ROW
				
Capital Cost	High cost UP right of way	Moderate to high cost, BN right of way	High cost UP right of way	High cost UP and BN right of way
				
Right-of-Way Issues/Cost	UP ROW	BNSF ROW	UP ROW	BNSF and UP ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	13.04	22.86	14.22	6.53
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	0.00	1.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	10.00	6.00	12.00	10.00
Number of Wetland Crossings	7.00	3.00	8.00	7.00
Total Acreage of Wetlands Within ROW	17.50	1.52	17.60	17.50
RANKING				

Evaluation Criteria	Alignment A5261	Alignment A5262	Alignment A5263	Alignment A5361
Floodplain Impacts				
Number of FEMA Floodplain Crossings	6.00	2.00	8.00	12.00
Associated Length (meters) of Floodplain Crossings	11119.71	516.57	11208.68	12768.31
Total Acreage of FEMA Floodplain Crossings	82.75	3.89	83.33	88.93
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	4.00	3.00	5.00	4.00
Count of Species along ROW	0.00	0.00	0.00	0.00
Sensitive Habitat Acreage w/in ROW	12.89	0.00	12.89	12.89
Net Sensitive Habitat Acreage along ROW	38.74	0.00	38.74	38.74
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	26683.00	14760.00	31348.00	21170.00
Low Income Within 1,400' Buffer – 1990 Households	169.00	169.00	169.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	84.32	270.02	84.32	47.38
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along	0.00	0.00	0.00	0.00

























































Evaluation Criteria	Alignment A5261	Alignment A5262	Alignment A5263	Alignment A5361
ROW RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.60	0.00	0.00
Total Acreage of Parks/Recreation Areas along ROW	2.38	2.81	2.38	2.32
Incidences of Parks/Recreation Areas in ROW	0.00	1.00	0.00	0.00
Incidences of Parks/Recreation Areas along ROW	5.00	3.00	5.00	1.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.5D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Fresno to Tulare Alignment

Evaluation Criteria	Alignment A5362	Alignment A5363	Alignment A5564	Alignment A5661
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 11.37 minutes Mag 9.76 minutes	VHS 16.49 minutes Mag 14.45 minutes	VHS 13.94 minutes Mag 12.11 minutes	VHS 14.62 minutes Mag 12.73 minutes
	N/A	N/A	N/A	N/A
Length	29.13 miles 46.89 km	47.92 miles 77.11 km	38.56 miles 62.06 km	41.03 miles 66.03 km
	N/A	N/A	N/A	N/A
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	BNSF ROW	BNSF and UP ROW	New ROW	UP ROW
				
Operational Issues	BNSF coordination	BNSF and UP coordination	New coordination	UP coordination
				

Evaluation Criteria	Alignment A5362	Alignment A5363	Alignment A5564	Alignment A5661
Construction Issues	BNSF ROW	BNSF and UP ROW	New ROW	UP ROW
				
Capital Cost	Moderate to high cost BN right of way	High cost UP right of way	Moderate to high cost E99 right of way	High cost UP right of way
				
Right-of-Way Issues/Cost	BNSF ROW	BNSF and UP ROW	New ROW	UP ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	13.21	9.34	6.92	6.38
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	1.00	0.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	6.00	12.00	13.00	10.00
Number of Wetland Crossings	3.00	8.00	16.00	8.00
Total Acreage of Wetlands Within ROW	1.52	17.60	9.71	17.77
RANKING				













Evaluation Criteria	Alignment A5362	Alignment A5363	Alignment A5564	Alignment A5661
Floodplain Impacts				
Number of FEMA Floodplain Crossings	9.00	14.00	14.00	6.00
Associated Length (meters) of Floodplain Crossings	2063.93	12857.28	11201.35	11119.71
Total Acreage of FEMA Floodplain Crossings	8.92	89.52	84.02	82.75
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	3.00	5.00	5.00	4.00
Count of Species along ROW	0.00	0.00	0.00	0.00
Sensitive Habitat Acreage w/in ROW	0.00	12.89	49.37	12.89
Net Sensitive Habitat Acreage along ROW	0.00	38.74	148.10	38.74
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	8401.00	25835.00	11722.00	17347.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	255.17	47.38	293.44	139.36
RANKING				







Evaluation Criteria	Alignment A5362	Alignment A5363	Alignment A5564	Alignment A5661
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.60	0.00	0.43	0.00
Total Acreage of Parks/Recreation Areas along ROW	2.75	2.32	1.64	2.32
Incidences of Parks/Recreation Areas in ROW	1.00	0.00	1.00	0.00
Incidences of Parks/Recreation Areas along ROW	0.00	1.00	0.00	1.00
RANKING	◐	◐	◐	◐
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
RANKING				
Seismic Constraints				
Not a Distinguishing Factor				
RANKING				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				
RANKING				

Table 4.1.5D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Fresno to Tulare Alignment

Evaluation Criteria	Alignment A5662	Alignment A5663	Alignment A5665	
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 12.06 minutes Mag 10.38 minutes	VHS 17.79 minutes Mag 15.64 minutes	VHS 13.78 minutes Mag 11.97 minutes	
	N/A	N/A	N/A	
Length	31.65 miles 50.93 km	52.68 miles 84.79 km	37.98 miles 61.13 km	
	N/A	N/A	N/A	
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	
<i>Minimize Operating and Capital Costs.</i>				
Length	BNSF ROW	UP ROW	New ROW	
	●	●	●	
Operational Issues	BNSF and Amtrak coordination	UP coordination	New ROW	
	●	●	●	

Evaluation Criteria	Alignment A5662	Alignment A5663	Alignment A5665	
Construction Issues	BNSF ROW	UP ROW	New ROW	
Capital Cost	Moderate to high cost BN right of way	High cost UP right of way	Low cost new right of way	
Right-of-Way Issues/Cost	BNSF ROW	UP ROW	New ROW	
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	14.22	9.01	2.34	
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	1.00	0.00	
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	6.00	12.00	4.00	
Number of Wetland Crossings	4.00	9.00	9.00	
Total Acreage of Wetlands Within ROW	1.80	17.88	20.00	
RANKING				

Evaluation Criteria	Alignment A5662	Alignment A5663	Alignment A5665	
Floodplain Impacts				
Number of FEMA Floodplain Crossings	2.00	8.00	6.00	
Associated Length (meters) of Floodplain Crossings	1064.79	11208.68	3768.30	
Total Acreage of FEMA Floodplain Crossings	8.02	83.33	28.57	
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	3.00	5.00	3.00	
Count of Species along ROW (Adjacent Buffer-ROW)	0.00	0.00	0.00	
Sensitive Habitat Acreage (ROW)	0.00	12.89	11.70	
Net Sensitive Habitat Acreage (Adjacent -ROW)	0.00	38.74	35.10	
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	5094.00	22012.00	5781.00	
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	314.89	139.36	304.06	
RANKING				

Evaluation Criteria	Alignment A5662	Alignment A5663	Alignment A5665	
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	
Number of National Register Resources along ROW	0.00	0.00	0.00	
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.60	0.00	0.00	
Total Acreage of Parks/Recreation Areas along ROW	2.75	2.32	0.00	
Incidences of Parks/Recreation Areas in ROW	1.00	0.00	0.00	
Incidences of Parks/Recreation Areas along ROW	0.00	1.00	0.00	
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				



Least Favorable

Most Favorable

4.1.6 Tulare to Bakersfield Segment

This segment operates from stations in Tulare and Kings Counties to the next station city of Bakersfield. In the Tulare/Kings area, five station sites have been evaluated. All four general routes arrive in the Tulare/Kings area as high-speed alternatives and depart in the same way. Each route is served by one station location only, except for the SP route, which has two locations. The choice of a single alignment alternative to depart from the Fresno area and to arrive in the Bakersfield area will be the largest factor in determining the alignment through this area and its station site.

A. THE TULARE/KINGS STATION SITES ARE:

S61 Visalia Airport

The S61 Visalia Airport station is located along the SP route near the junction of SR 99 and SR 198 at the Visalia Airport. A location on the west side of Highway 99 is possible, although not on the airport property as such. A flyover to the airport itself is also feasible. The exact site is subject to land acquisition considerations. The exact location and orientation of a station on airport property would depend on aviation requirements.

S62 Hanford

The S62 Hanford station would be located in the vicinity of the existing Amtrak intermodal station on Santa Fe Avenue in the City of Hanford.

S63 Tulare Airport

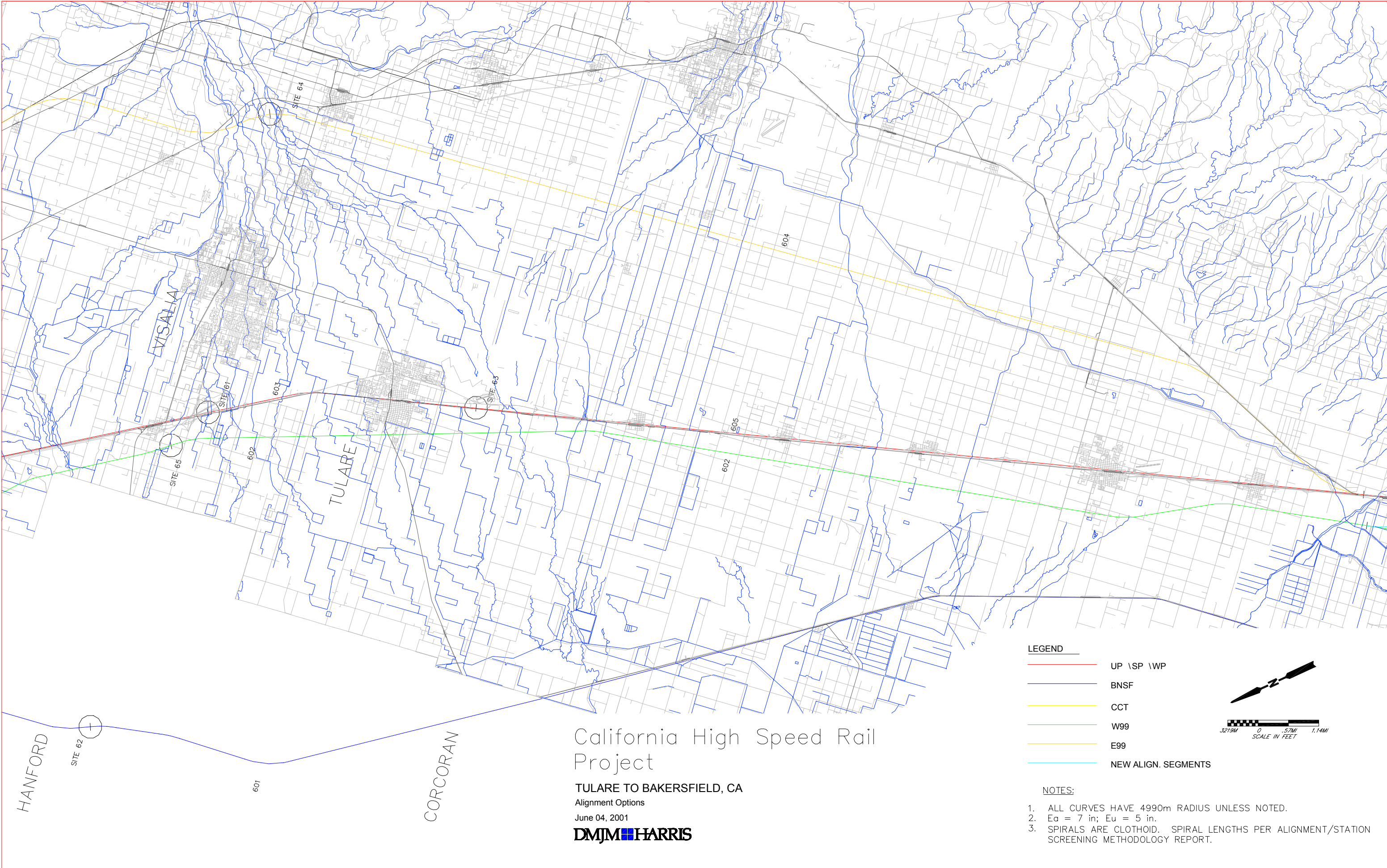
The S63 Tulare Airport station is located along the SP route south of the City of Tulare at the Mefford Field Airport. The characteristics of the site are similar to the S61 Visalia Airport station.

S64 Tulare East County

The S64 Tulare East County Station is a standard configuration station on the E99 conceptual freeway alignment. It would be located east of the City of Visalia near the crossing of SR 198.

S65 Tulare West County

The S65 Tulare West County station is a standard configuration station on the W99 conceptual alignment. It would be located at the point where SR 198 crosses the alignment.

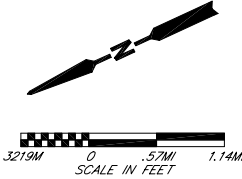


LEGEND

- UP \ SP \ WP
- BNSF
- CCT
- W99
- E99
- NEW ALIGN. SEGMENTS

NOTES:

- ALL CURVES HAVE 4990m RADIUS UNLESS NOTED.
- Ea = 7 in; Eu = 5 in.
- SPIRALS ARE CLOTHOID. SPIRAL LENGTHS PER ALIGNMENT/STATION SCREENING METHODOLOGY REPORT.



California High Speed Rail Project

TULARE TO BAKERSFIELD, CA

Alignment Options

June 04, 2001

DMJM HARRIS

B. THE TULARE AREA ALIGNMENTS ARE AS FOLLOWS:

All four alignment routes traverse the Tulare and Kings County areas on high-speed alignments as they connect the Fresno Area with Bakersfield. The alignments each serve a single station (or in the case of the SP route, one of two stations). The choice of alignment for this region will follow from the prior choice of station sites and associated alignments in Fresno and Bakersfield.

The BNSF route consists of Line Segments 514 from Fresno and 601 to Bakersfield, serving station S62 Hanford.

The W99 route consists of Line Segments 515 from Fresno and 602 to Bakersfield, serving station S65 Tulare West County.

The SP route consists of Line Segments 517 from Fresno and 603 and 605 to Bakersfield, serving stations S61 Visalia Airport or S63 Tulare Airport.

The E99 route consists of Line Segments 518 from Fresno and 604 to Bakersfield, serving station S64 Tulare East County.

Tulare Stations Track Alignments

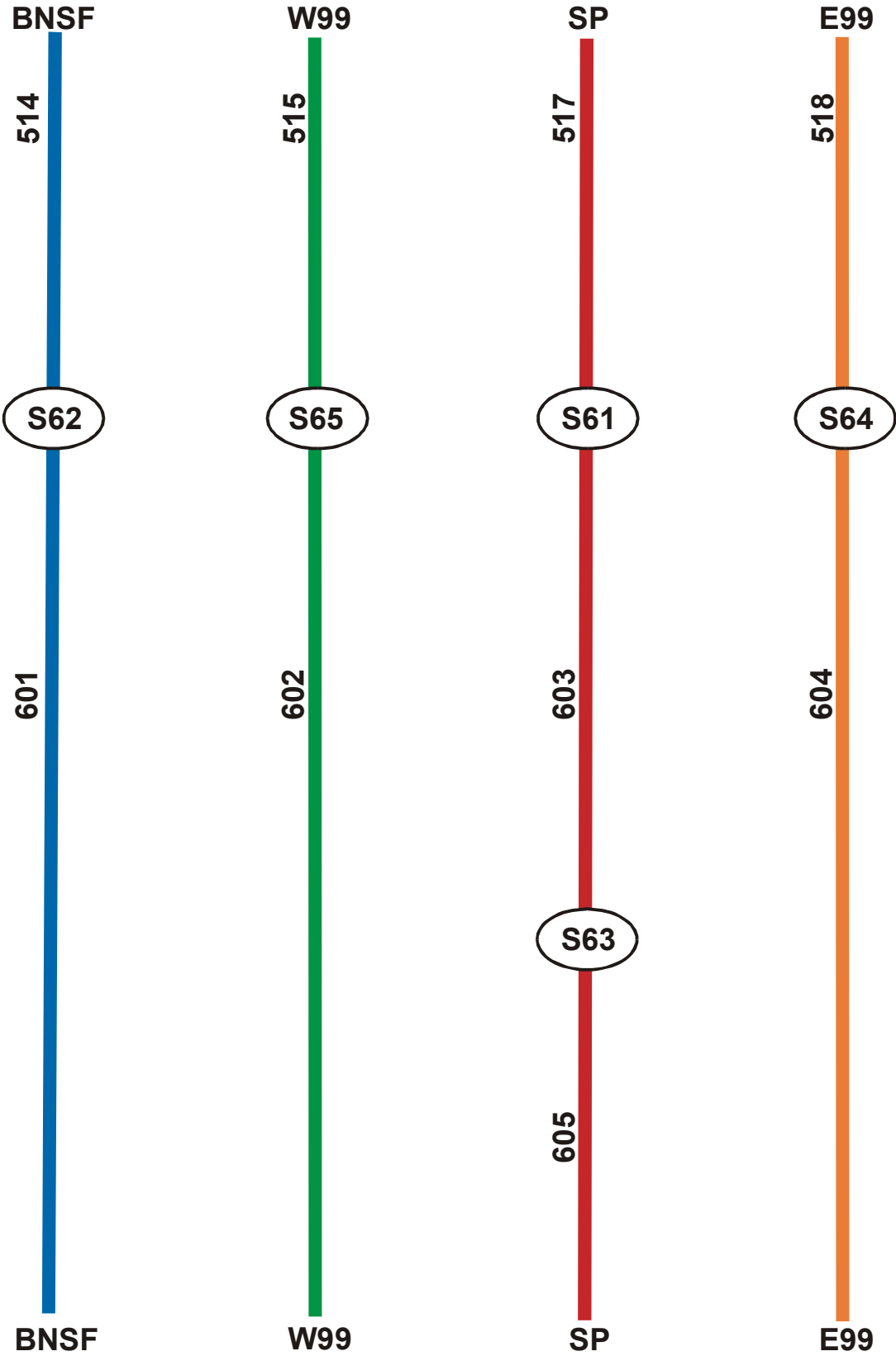


Figure 4.1.6B

Segment 6
Tulare to Bakersfield
Station to Station Alignments

Alignment #	Stations	Line Segments	Associated Through Line Segments
A6171	S61 Visalia Airport to S71 Bakersfield Truxton	603, 605, 606, 613, 701, 706	N/A
A6172	S61 Visalia Airport to S72 Bakersfield Golden State	603, 605, 606, 613, 701	N/A
A6173	S61 Visalia Airport to S73 Bakersfield Airport	603, 605, 606, 613	N/A
A6174	S61 Visalia Airport to S74 Bakersfield West	603, 605, 606, 607, 610	N/A
A6175	S61 Visalia Airport to S75 Bakersfield East	603, 605, 606, 613, 701, 702, 704	N/A
A6176	S61 Visalia Airport to S76 Bakersfield Old Amtrak	Not Applicable	
A6177	S61 Visalia Airport to S77 Bakersfield South	603, 605, 606, 607, 610, 708	N/A
A6271	S62 Hanford to S71 Bakersfield Truxton	601, 612, 707	611, 610
A6272	S62 Hanford to S72 Bakersfield Golden State	Not Applicable	
A6273	S62 Hanford to S73 Bakersfield Airport	Not Applicable	
A6274	S62 Hanford to S74 Bakersfield West	601, 611, 610	N/A
A6275	S62 Hanford to S75 Bakersfield East	601, 612, 707, 724, 704	611, 610
A6276	S62 Hanford to S76 Bakersfield Old Amtrak	601, 612	611, 610
A6277	S62 Hanford to S77 Bakersfield South	601, 611, 610, 708	N/A
A6371	S63 Tulare Airport to S71 Bakersfield Truxton	605, 606, 613, 701, 706	N/A
A6372	S63 Tulare Airport to S72 Bakersfield Golden State	605, 606, 613, 701	N/A
A6373	S63 Tulare Airport to S73 Bakersfield Airport	605, 606, 613	N/A
A6374	S63 Tulare Airport to S74 Bakersfield West	605, 606, 607, 610	N/A
A6375	S63 Tulare Airport to S75 Bakersfield East	605, 606, 613, 701, 702, 704	N/A
A6376	S63 Tulare Airport to S76 Bakersfield Old Amtrak	Not Applicable	
A6377	S63 Tulare Airport to S77 Bakersfield South	605, 606, 607, 610, 708	N/A
A6471	S64 Tulare East County to S71 Bakersfield Truxton	604, 606, 613, 701, 706	N/A
A6472	S64 Tulare East County to S72 Bakersfield Golden State	604, 606, 613, 701	N/A
A6473	S64 Tulare East County to S73 Bakersfield Airport	604, 606, 613	N/A
A6474	S64 Tulare East County to S74 Bakersfield West	604, 606, 607, 610	N/A
A6475	S64 Tulare East County to S75 Bakersfield East	604, 606, 613, 701, 702, 704	N/A
A6476	S64 Tulare East County to S76 Bakersfield Old Amtrak	Not Applicable	
A6477	S64 Tulare East County to S77 Bakersfield South	604, 606, 607, 610, 708	N/A
A6571	S65 Tulare West County to S71 Bakersfield Truxton	602, 608, 613, 701, 706	N/A
A6572	S65 Tulare West County to S72 Bakersfield Golden State	602, 608, 613, 701	N/A
A6573	S65 Tulare West County to S73 Bakersfield Airport	602, 608, 613	N/A
A6574	S65 Tulare West County to S74 Bakersfield West	602, 609, 610	N/A
A6575	S65 Tulare West County to S75 Bakersfield East	602, 608, 613, 701, 702, 704	N/A
A6576	S65 Tulare West County to S76 Bakersfield Old Amtrak	Not Applicable	
A6577	S65 Tulare West County to S77 Bakersfield South	602, 609, 610, 708	N/A

C. STATION SCREENING CONSIDERATIONS

Planning: The stations in this segment will be the most modest in the Central Valley region and serve a widely dispersed region that includes the Cities of Visalia, Tulare, Hanford, Porterville and others. Each of the general routes through the Valley would serve one of these sites only, with the exception of the SP route, which could serve either S61 Visalia Airport or S63 Tulare Airport. The Tulare County stations, plus Hanford, split the alignments from Fresno, about 35 miles to the north, to Bakersfield, about 70 miles to the south. Otherwise the line would run without station coverage for 90 to 105 miles.

S61 Visalia Airport

The S61 Visalia Airport station site would be located on the existing SP rail route, which here runs near the western side of the SR 99 Freeway. It is the closest station site to Visalia, the largest population center in the area. The site is adjacent to the interchange of the SR 99 and SR 198 Freeways just west of Visalia. The City of Visalia owns land on each side of the 99 Freeway.

Environmental: The Visalia Airport site contains one natural stream and a small portion of two wetlands. In addition, a large section of the site is within the 100-year floodplain. The site has no sensitive wildlife habitat, farmlands, nationally registered historic sites, public parks, or recreation areas. Furthermore, it would not pose any environmental justice concerns and about 2/3 of the station are land uses that would not conflict with a HSR station (farmlands and transportation-related uses).

S63 Tulare Airport

The S63 Tulare Airport station site also is on the existing SP rail route. It has similar access characteristics, but has a smaller catchment area.

Environmental: Although the Tulare Airport site would not raise environmental justice, farmlands, nationally registered historic sites, or natural streams impacts, it could disturb a small area of wetlands, as well as one public park and one endangered/threatened species. In addition, a significant portion of the site is within a 100-year floodplain (146 acres). However, approximately 75% of the site are occupied by compatible land uses.

S62 Hanford

The S62 Hanford station site is located on the BNSF rail route and is the farthest west in the area and would require long auto and transit access paths from most of the region.

Environmental: The Hanford site contains no wetlands, sensitive wildlife habitat, natural streams, floodplains, farmlands, nationally registered historic sites, public parks, or recreation areas. However, 67% of the land within this site is occupied by land uses considered incompatible or visually sensitive to a HSR station.

S64 Tulare East County and S65 Tulare West County

The S64 Tulare East County and S65 Tulare West County station sites are conceptual points on alignments in new territory. The eastern station would serve the E99 route in an area of low population still mostly in agricultural uses. The western station serves the W99 route and is also in agricultural territory, roughly midway between the SR 99 Freeway and Hanford.









Environmental: The East County site contains a number of potential environmental constraints: a scenic corridor, two natural streams, three wetlands (about 17 acres), three endangered/threatened species, significant sensitive habitat (about 330 acres), and recreation lands (about 110 acres). In addition, it resides largely within the 100-year floodplain. Because the site is on agricultural lands (but not prime, unique, or statewide important farmlands), it would not result in land use and visual compatibility or environmental justice concerns. Furthermore, there are no nationally registered historic properties at the site.

The West County site contains significant natural resources, including one natural stream, three wetlands, and four endangered/threatened species, and is partially within the 100-year floodplain. In addition, this site has a moderate number of ethnic minorities (about 700 persons). On the plus side, this site would not affect nationally registered historic sites, public parks, or prime, unique, or statewide important farmlands (even though the site is on agricultural lands). The site would not result in land use and visual compatibility or environmental justice concerns.

















Engineering: All stations would be similar in design and construction. They could be sited to avoid most construction difficulties.

Cost: All stations would be similar in cost, tending toward lower investment levels.

Table 4.1.6C
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Tulare Stations

Evaluation Criteria	Station S61 Visalia Airport	Station S62 Hanford	Station S63 Tulare Airport	Station S64 Tulare East County
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Population/Employment Catchment				
				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	<ul style="list-style-type: none"> • Outlying location. • Freeway access: SR 99 and SR 198 adjacent. • Street access: local streets off freeway to airport. • Parking adequate at shared airport sites. • Transit: bus only • Other rail: none 	<ul style="list-style-type: none"> • Suburban location in settled community. • Freeway access: SR 198 ca ½ mile • Street access: Local city streets • Parking: limited at site. • Transit: local Hanford transit good, long access routes from Visalia and other cities. • Other rail: Amtrak connection. 	<ul style="list-style-type: none"> • Outlying location. • Freeway access: SR 99 adjacent. • Street access: local streets off freeway to airport. • Parking adequate at shared airport sites. • Transit: none • Other rail: none 	<ul style="list-style-type: none"> • Exurban site. • Freeway access: close to conceptual SR 65 Freeway in future • Arterial access via SR 198 • No transit access.
				
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Evaluation Criteria	Station S61 Visalia Airport	Station S62 Hanford	Station S63 Tulare Airport	Station S64 Tulare East County
Operational Issues	Compatibility with UP freight	Compatibility with BNSF freight	Compatibility with UP freight	New greenfields site. No major issues, except distance from urban areas.
Construction Issues	Open site. Some flooding issues possible.	Interaction with freight railroads and Amtrak station operations.	Open site.	New greenfields site. Nor major issues.
Capital Cost	Low	Low.	Low	Low
Right-of-Way Issues/Cost	City of Visalia owns land on both sides of freeway in vicinity of airport.	RR right-of-way and adjacent uses.	Moderate.	Open agricultural land on new alignment of freeway.
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	34.54	67.18	25.85	6.59
Primary Land Uses (acreage) within station area	Farmlands/Agriculture (171); Open Space (63); Recreational (67); Transportation (133)	Commercial (94); Institutional (103); Office (56); Residential (235)	Farmlands/Agriculture (213); Industrial (144); Institutional (56); Residential (48)	Farmlands/Agriculture (468)
RANKING				
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	34.54	67.18	25.85	6.59
Number of scenic corridor and scenic river crossings	0	0	0	1
RANKING				

Evaluation Criteria	Station S61 Visalia Airport	Station S62 Hanford	Station S63 Tulare Airport	Station S64 Tulare East County
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	1	0	0	2
Number of Wetland Crossings	2	0	1	3
Total Acreage of Wetlands within Station Area	1.22	0	1.01	16.47
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	2	0	1	1
Total Acreage of FEMA Floodplain Crossings within Station Area	387.21	0	146.13	351.98
RANKING				
Threatened & Endangered Species Impacts				
Count of Species	0	0	1	3
Acreage of Sensitive Habitat within Station Area	0	0	0	329.7
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	0	0	0	0
Low Income Within 1,400' Buffer – 1990 Households	0	0	0	0
RANKING				

Evaluation Criteria	Station S61 Visalia Airport	Station S62 Hanford	Station S63 Tulare Airport	Station S64 Tulare East County
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	0	0	0	0
RANKING	●	●	●	●
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0	0	0	0
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in Station Area	0	0	1	1
Count of Parks/Recreation Areas	0	0	0.37	109.47
RANKING	●	●	◐	○
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				

Evaluation Criteria	Station S61 Visalia Airport	Station S62 Hanford	Station S63 Tulare Airport	Station S64 Tulare East County
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				











Least Favorable Most Favorable

Table 4.1.6C continued
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Tulare Stations

Evaluation Criteria	Station S65 Tulare West County			
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable			
Length	Not Applicable			
Population/Employment Catchment				
	⓪			
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	<ul style="list-style-type: none"> • Suburban location. • Freeway access: Somewhat distant from SR 99 • Arterial access from SR 198 • No transit access 			
	⓪			
<i>Minimize Operating and Capital Costs.</i>				
Length				
Operational Issues	New greenfields site. No major issues			
	⓪			

Evaluation Criteria	Station S65 Tulare West County			
Construction Issues	New greenfields site. No major issues.			
Capital Cost	Low			
Right-of-Way Issues/Cost	New greenfields site on open agricultural land.			
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	3.99			
Primary Land Uses (acreage) within station area RANKING	Farmlands/Agriculture (479)			
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	3.99			
Number of scenic corridor and scenic river crossings RANKING	0			

Evaluation Criteria	Station S65 Tulare West County			
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	1			
Number of Wetland Crossings	3			
Total Acreage of Wetlands within Station Area	3.21			
RANKING				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	1			
Total Acreage of FEMA Floodplain Crossings within Station Area	131.13			
RANKING				
Threatened & Endangered Species Impacts				
Count of Species	4			
Acreage of Sensitive Habitat within Station Area	0			
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	728			
Low Income Within 1,400' Buffer – 1990 Households	0			
RANKING				

Evaluation Criteria	Station S65 Tulare West County			
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	0			
RANKING				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0			
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Count of Parks/Recreation Areas	0			
Total Acreage Parks/Recreation Areas in Station Area	0			
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				

Evaluation Criteria	Station S65 Tulare West County			
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				






 Least Favorable Most Favorable

D. ALIGNMENT SCREENING CONSIDERATIONS

Each of the alignment possibilities reflects the general characteristics of the four major routes through the region. The BNSF is the shortest on this segment, with the E99 longest. The choice of alignment through this 100-mile-long stretch of the region from Fresno to Bakersfield will depend on coordinated decisions made on station sites and alignments in those two cities.

Overview of Environmental Impacts on the 29 Alignment Variations

Alignment variations between Tulare and Bakersfield were analyzed using the nine environmental evaluation criteria.

Three alignments exhibited the lowest level of impact in this segment. These are:

- A6471 Tulare East County to Bakersfield Truxton,
- A6472 Tulare East County to Bakersfield Golden Gate, and
- A6473 Tulare East County to Bakersfield Airport.

All three alignments exhibit similar impacts. They are in the lowest impact category for land use, floodplains, threatened and endangered species, environmental justice, cultural resources, and parks and recreation. They have somewhat greater impacts on visual resources, water resources, and farmland.

Two other alignments exhibited somewhat more impacts, but were akin to the first two in overall impacts. These are:

- A6474 Tulare East County to Bakersfield West, and
- A6475 Tulare East County to Bakersfield East.

Both of these alignments have somewhat higher levels of impact to land use, and A6475 has somewhat greater impacts to floodplains.

























Four alignments exhibiting the greatest level of impacts are:

- A6177 Visalia Airport to Bakersfield South,
- A6275 Hanford to Bakersfield East
- A6277 Hanford to Bakersfield South, and
- A6377 Tulare Airport to Bakersfield South.

These four alignments had greater impacts on land use, water resources, threatened and endangered species, environmental justice and parks and recreation than any of the five alignments discussed above. Compared to the five alignments, these four all had fewer impacts to visual resources. Impacts to farmland were greater for the two alignments from Hanford but were similar for the Visalia and Tulare origin alignments, when compared to the five alignments above.

Table 4.1.6D
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Tulare to Bakersfield Alignment

Evaluation Criteria	Alignment A6171	Alignment A6172	Alignment A6173	Alignment A6174
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 22.81 minutes Mag 20.24 minutes	VHS 22.31 minutes Mag 19.78 minutes	VHS 20.94 minutes Mag 18.53 minutes	VHS 21.47 minutes Mag 19.02 minutes
	N/A	N/A	N/A	N/A
Length	71.07 miles 114.37 km	69.23 miles 111.41 km	64.23 miles 103.37 km	66.18 miles 106.50 km
	N/A	N/A	N/A	N/A
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	UP ROW	UP ROW	UP ROW	UP and new ROW
	◐	◐	◐	◐
Operational Issues	UP coordination	UP coordination	UP coordination	UP coordination
	◐	◐	◐	◐

























Evaluation Criteria	Alignment A6171	Alignment A6172	Alignment A6173	Alignment A6174
Construction Issues	UP ROW Bakersfield downtown	UP ROW Bakersfield downtown	UP ROW	UP and new ROW
				
Capital Cost	High cost UP right of way	High cost UP right of way	High cost UP right of way	High cost UP right of way
				
Right-of-Way Issues/Cost	UP ROW Bakersfield downtown	UP ROW Bakersfield downtown	UP ROW	UP ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	12.69	12.73	11.17	16.83
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	0.00	0.00	0.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	8.00	8.00	8.00	8.00
Number of Wetland Crossings	26.00	26.00	26.00	26.00
Total Acreage of Wetlands Within ROW	7.35	7.35	7.35	7.48
RANKING				

















Evaluation Criteria	Alignment A6171	Alignment A6172	Alignment A6173	Alignment A6174
Floodplain Impacts				
Number of FEMA Floodplain Crossings	9.00	8.00	7.00	7.00
Associated Length (meters) of Floodplain Crossings	34389.38	34332.27	34146.48	34146.48
Total Acreage of FEMA Floodplain Crossings	226.63	226.41	225.71	225.71
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	23.00	23.00	23.00	25.00
Count of Species along ROW	1.00	1.00	1.00	1.00
Sensitive Habitat Acreage w/in ROW	2.51	2.51	0.00	0.00
Net Sensitive Habitat Acreage along ROW	18.20	18.20	0.00	0.00
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	36201.00	35551.00	35551.00	35551.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	166.21	166.21	166.19	177.25
RANKING				

Evaluation Criteria	Alignment A6171	Alignment A6172	Alignment A6173	Alignment A6174
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	10.06	10.06	9.26	9.26
Total Acreage of Parks/Recreation Areas along ROW	69.09	69.09	64.00	64.00
Incidences of Parks/Recreation Areas in ROW	3.00	3.00	1.00	1.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
RANKING	○	○	○	○
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.6D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Tulare to Bakersfield Alignment

Evaluation Criteria	Alignment A6175	Alignment A6177	Alignment A6271	Alignment A6274
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 24.44 minutes Mag 21.73 minutes	VHS 25.15 minutes Mag 22.39 minutes	VHS 25.71 minutes Mag 22.90 minutes	VHS 23.42 minutes Mag 20.80 minutes
	N/A	N/A	N/A	N/A
Length	77.05 miles 124.00 km	79.67 miles 128.22 km	81.70 miles 131.48 km	73.31 miles 117.97 km
	N/A	N/A	N/A	N/A
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	UP ROW	UP and new ROW	BNSF ROW	BNSF ROW
	◐	◐	◐	◐
Operational Issues	UP coordination	UP coordination	BNSF coordination	BNSF coordination
	◐	◐	◐	◐

Evaluation Criteria	Alignment A6175	Alignment A6177	Alignment A6271	Alignment A6274
Construction Issues	UP ROW	UP and new ROW Kern River crossing	BNSF ROW	BNSF ROW
				
Capital Cost	High cost UP right of way	High cost UP right of way	High cost BN right of way	Moderate to high cost BN right of way
				
Right-of-Way Issues/Cost	UP ROW	UP and new ROW Kern River crossing	BNSF ROW	BNSF ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	13.58	22.03	11.62	12.17
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	0.00	0.00	0.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	8.00	9.00	9.00	6.00
Number of Wetland Crossings	26.00	29.00	25.00	23.00
Total Acreage of Wetlands Within ROW	7.35	8.85	45.50	44.31
RANKING				

Evaluation Criteria	Alignment A6175	Alignment A6177	Alignment A6271	Alignment A6274
Floodplain Impacts				
Number of FEMA Floodplain Crossings	9.00	11.00	11.00	10.00
Associated Length (meters) of Floodplain Crossings	37843.83	36728.17	19851.62	19350.70
Total Acreage of FEMA Floodplain Crossings	241.73	241.04	152.31	150.04
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	25.00	28.00	28.00	26.00
Count of Species along ROW	1.00	1.00	1.00	1.00
Sensitive Habitat Acreage w/in ROW	2.51	21.55	26.49	14.40
Net Sensitive Habitat Acreage along ROW	18.20	91.68	101.26	42.20
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	49295.00	35551.00	24023.00	22954.00
Low Income Within 1,400' Buffer – 1990 Households	262.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	167.53	279.25	433.88	425.28
RANKING				

























































Evaluation Criteria	Alignment A6175	Alignment A6177	Alignment A6271	Alignment A6274
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	1.00	1.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	10.06	9.26	1.98	0.92
Total Acreage of Parks/Recreation Areas along ROW	69.09	64.00	15.08	9.43
Incidences of Parks/Recreation Areas in ROW	3.00	1.00	3.00	1.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	1.00	1.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.6D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Tulare to Bakersfield Alignment

Evaluation Criteria	Alignment A6275	Alignment A6276	Alignment A6277	Alignment A6371
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 27.46 minutes Mag 24.50 minutes	VHS 25.31 minutes Mag 22.53 minutes	VHS 27.10 minutes Mag 24.17 minutes	VHS 19.63 minutes Mag 17.33 minutes
	N/A	N/A	N/A	N/A
Length	88.11 miles 141.81 km	80.25 miles 129.14 km	86.80 miles 139.69 km	59.41 miles 95.61 km
	N/A	N/A	N/A	N/A
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	BNSF ROW	BNSF ROW	BNSF ROW	UP ROW
				
Operational Issues	BNSF and Amtrak coordination	BNSF and Amtrak coordination	BNSF and Amtrak coordination	UP coordination
				

Evaluation Criteria	Alignment A6275	Alignment A6276	Alignment A6277	Alignment A6371
Construction Issues	BNSF ROW	BNSF ROW	BNSF ROW Kern River crossing	UP ROW
				
Capital Cost	High cost BN right of way	High cost BN right of way	Moderate to high cost BN right of way	High cost UP right of way
				
Right-of-Way Issues/Cost	BNSF ROW Downtown Bakersfield	BNSF ROW Downtown Bakersfield	BNSF ROW Kern River crossing	UP ROW Downtown Bakersfield
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	12.35	11.85	17.78	11.62
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	0.00	0.00	0.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	9.00	9.00	7.00	6.00
Number of Wetland Crossings	25.00	25.00	26.00	25.00
Total Acreage of Wetlands Within ROW	45.50	45.50	45.68	7.25
RANKING				

Evaluation Criteria	Alignment A6275	Alignment A6276	Alignment A6277	Alignment A6371
Floodplain Impacts				
Number of FEMA Floodplain Crossings	12.00	11.00	14.00	7.00
Associated Length (meters) of Floodplain Crossings	23363.17	19851.62	21932.39	34300.41
Total Acreage of FEMA Floodplain Crossings	167.63	152.31	165.37	226.04
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	30.00	28.00	29.00	22.00
Count of Species along ROW	1.00	1.00	1.00	1.00
Sensitive Habitat Acreage w/in ROW	26.49	26.49	35.96	2.51
Net Sensitive Habitat Acreage along ROW	101.26	101.26	133.88	18.20
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	36733.00	22954.00	22954.00	31536.00
Low Income Within 1,400' Buffer – 1990 Households	199.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	435.20	433.88	527.28	166.21
RANKING				

















































Evaluation Criteria	Alignment A6275	Alignment A6276	Alignment A6277	Alignment A6371
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	1.00	1.00	1.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	1.98	1.98	0.92	10.06
Total Acreage of Parks/Recreation Areas along ROW	15.08	15.08	9.43	69.09
Incidences of Parks/Recreation Areas in ROW	3.00	3.00	1.00	3.00
Incidences of Parks/Recreation Areas along ROW	1.00	1.00	1.00	0.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.6D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Tulare to Bakersfield Alignment

Evaluation Criteria	Alignment A6372	Alignment A6373	Alignment A6374	Alignment A6375
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 19.13 minutes Mag 16.87 minutes	VHS 17.76 minutes Mag 15.62 minutes	VHS 18.30 minutes Mag 16.10 minutes	VHS 21.26 minutes Mag 18.82 minutes
	N/A	N/A	N/A	N/A
Length	57.57 miles 92.65 km	52.58 miles 84.61 km	54.52 miles 87.75 km	65.40 miles 105.24 km
	N/A	N/A	N/A	N/A
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	UP ROW	UP ROW	UP and new ROW	UP ROW
	◐	◐	◐	◐
Operational Issues	UP coordination	UP coordination	UP coordination	UP coordination
	◐	◐	◐	◐

























Evaluation Criteria	Alignment A6372	Alignment A6373	Alignment A6374	Alignment A6375
Construction Issues	UP ROW Downtown Bakersfield	UP ROW Bakersfield suburbs	UP ROW	UP ROW Downtown Bakersfield
				
Capital Cost	High cost UP right of way	High cost UP right of way	High cost UP right of way	High cost UP right of way
				
Right-of-Way Issues/Cost	UP ROW Downtown Bakersfield	UP ROW Bakersfield suburbs	UP ROW	UP ROW Downtown Bakersfield
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	11.63	9.61	16.58	12.77
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	0.00	0.00	0.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	6.00	6.00	6.00	6.00
Number of Wetland Crossings	25.00	25.00	25.00	25.00
Total Acreage of Wetlands Within ROW	7.25	7.25	7.38	7.25
RANKING				

Evaluation Criteria	Alignment A6372	Alignment A6373	Alignment A6374	Alignment A6375
Floodplain Impacts				
Number of FEMA Floodplain Crossings	6.00	5.00	5.00	7.00
Associated Length (meters) of Floodplain Crossings	34243.30	34057.51	34057.51	37754.86
Total Acreage of FEMA Floodplain Crossings	225.83	225.13	225.13	241.14
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	22.00	22.00	24.00	24.00
Count of Species along ROW (Adjacent Buffer-ROW)	1.00	1.00	1.00	1.00
Sensitive Habitat Acreage (ROW)	2.51	0.00	0.00	2.51
Net Sensitive Habitat Acreage (Adjacent -ROW)	18.20	0.00	0.00	18.20
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	30886.00	30886.00	30886.00	44630.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	262.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	166.21	166.19	177.25	167.53
RANKING				

Evaluation Criteria	Alignment A6372	Alignment A6373	Alignment A6374	Alignment A6375
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	10.06	9.26	9.26	10.06
Total Acreage of Parks/Recreation Areas along ROW	69.09	64.00	64.00	69.09
Incidences of Parks/Recreation Areas in ROW	3.00	1.00	1.00	3.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
RANKING	○	○	○	○
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.6D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Tulare to Bakersfield Alignment

Evaluation Criteria	Alignment A6377	Alignment A6471	Alignment A6472	Alignment A6473
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 21.98 minutes Mag 19.48 minutes	VHS 22.95 minutes Mag 20.37 minutes	VHS 22.44 minutes Mag 19.91 minutes	VHS 21.08 minutes Mag 18.66 minutes
	N/A	N/A	N/A	N/A
Length	68.02 miles 109.46 km	71.57 miles 115.19 km	69.73 miles 112.22 km	67.74 miles 104.18 km
	N/A	N/A	N/A	N/A
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	UP ROW	E99 and UP ROW	E99 and UP ROW	E99 and UP ROW
	●	●	●	●
Operational Issues	UP coordination	UP coordination	UP coordination	UP coordination
	●	●	●	●

























Evaluation Criteria	Alignment A6377	Alignment A6471	Alignment A6472	Alignment A6473
Construction Issues	UP and new ROW Kern River crossing	UP ROW Downtown Bakersfield	UP ROW Bakersfield suburbs	UP ROW
				
Capital Cost	High cost UP right of way	Moderate to high cost UP right of way	Moderate costs	Moderate to low costs
				
Right-of-Way Issues/Cost	UP and new ROW Kern River crossing	UP ROW Downtown Bakersfield	UP ROW Bakersfield suburbs	UP and new ROW
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	22.75	4.91	4.70	2.42
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	1.00	1.00	1.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	7.00	9.00	9.00	9.00
Number of Wetland Crossings	28.00	15.00	15.00	15.00
Total Acreage of Wetlands Within ROW	8.74	8.92	8.92	8.92
RANKING				

















Evaluation Criteria	Alignment A6377	Alignment A6471	Alignment A6472	Alignment A6473
Floodplain Impacts				
Number of FEMA Floodplain Crossings	9.00	13.00	12.00	11.00
Associated Length (meters) of Floodplain Crossings	36639.20	19460.75	19403.64	19217.85
Total Acreage of FEMA Floodplain Crossings	240.46	145.71	145.50	144.80
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	27.00	6.00	6.00	6.00
Count of Species along ROW (Adjacent Buffer-ROW)	1.00	1.00	1.00	1.00
Sensitive Habitat Acreage (ROW)	21.55	4.96	4.96	2.44
Net Sensitive Habitat Acreage (Adjacent -ROW)	91.68	25.53	25.53	7.32
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	30886.00	4493.00	3843.00	3843.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	279.25	252.83	252.83	252.81
RANKING				

Evaluation Criteria	Alignment A6377	Alignment A6471	Alignment A6472	Alignment A6473
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	9.26	0.80	0.80	0.00
Total Acreage of Parks/Recreation Areas along ROW	64.00	5.09	5.09	0.00
Incidences of Parks/Recreation Areas in ROW	1.00	2.00	2.00	0.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
RANKING	○	●	●	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.6D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Tulare to Bakersfield Alignment

Evaluation Criteria	Alignment A6474	Alignment A6475	Alignment A6477	Alignment A6571
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 21.61 minutes Mag 19.14 minutes	VHS 24.58 minutes Mag 21.86 minutes	VHS 25.29 minutes Mag 22.52 minutes	VHS 23.03 minutes Mag 20.45 minutes
	N/A	N/A	N/A	N/A
Length	66.68 miles 107.31 km	77.56 miles 124.81 km	80.18 miles 129.03 km	71.90 miles 115.71 km
	N/A	N/A	N/A	N/A
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	UP and new ROW	UP and new ROW	UP and new ROW	UP and new ROW
	◐	◐	◐	◐
Operational Issues	UP coordination	UP coordination	UP coordination	UP coordination
	◐	◐	◐	◐

























Evaluation Criteria	Alignment A6474	Alignment A6475	Alignment A6477	Alignment A6571
Construction Issues	UP ROW	UP ROW	UP ROW Kern River crossing	UP ROW Downtown Bakersfield
				
Capital Cost	Moderate to low costs	High costs UP right of way	Moderate costs	Moderate to high costs
				
Right-of-Way Issues/Cost	UP ROW	UP ROW	UP ROW Kern River crossing	UP ROW Downtown Bakersfield
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	8.62	6.43	15.39	8.12
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	1.00	1.00	1.00	0.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	9.00	9.00	10.00	12.00
Number of Wetland Crossings	15.00	15.00	18.00	21.00
Total Acreage of Wetlands Within ROW	9.05	8.92	10.41	30.93
RANKING				

Evaluation Criteria	Alignment A6474	Alignment A6475	Alignment A6477	Alignment A6571
Floodplain Impacts				
Number of FEMA Floodplain Crossings	11.00	13.00	15.00	11.00
Associated Length (meters) of Floodplain Crossings	19217.85	22915.20	21799.54	22892.38
Total Acreage of FEMA Floodplain Crossings	144.80	160.81	160.12	170.11
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	8.00	8.00	11.00	16.00
Count of Species along ROW (Adjacent Buffer-ROW)	1.00	1.00	1.00	0.00
Sensitive Habitat Acreage (ROW)	2.44	4.96	23.99	20.15
Net Sensitive Habitat Acreage (Adjacent -ROW)	7.32	25.53	99.00	71.03
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	3843.00	17587.00	3843.00	12259.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	262.00	0.00	0.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	263.87	254.16	365.88	262.88
RANKING				

Evaluation Criteria	Alignment A6474	Alignment A6475	Alignment A6477	Alignment A6571
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	0.00	0.80	0.00	6.95
Total Acreage of Parks/Recreation Areas along ROW	0.00	5.09	0.00	23.56
Incidences of Parks/Recreation Areas in ROW	0.00	2.00	0.00	3.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
RANKING	●	●	●	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.6D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Tulare to Bakersfield Alignment

Evaluation Criteria	Alignment A6572	Alignment A6573	Alignment A6574	Alignment A6575
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 22.53 minutes Mag 19.99 minutes	VHS 21.17 minutes Mag 18.74 minutes	VHS 21.87 minutes Mag 19.38 minutes	VHS 24.67 minutes Mag 21.94 minutes
	N/A	N/A	N/A	N/A
Length	70.06 miles 112.75 km	65.06 miles 104.70 km	67.64 miles 108.86 km	77.88 miles 125.33 km
	N/A	N/A	N/A	N/A
Population/Employment Catchment	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable	Not Applicable	Not Applicable	Not Applicable
<i>Minimize Operating and Capital Costs.</i>				
Length	UP and new ROW	UP and new ROW	New ROW	UP and new ROW
	●	●	●	●
Operational Issues	UP coordination	UP coordination		UP coordination
	●	●	●	●

Evaluation Criteria	Alignment A6572	Alignment A6573	Alignment A6574	Alignment A6575
Construction Issues	UP ROW	UP ROW	New ROW	UP ROW Downtown Bakersfield
				
Capital Cost	Moderate to high costs	Moderate costs	Moderate to low costs	High costs
				
Right-of-Way Issues/Cost	UP ROW	UP ROW	New ROW	UP ROW Downtown Bakersfield
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	8.01	6.05	12.79	9.37
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00	0.00	0.00	0.00
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	12.00	12.00	12.00	12.00
Number of Wetland Crossings	21.00	21.00	22.00	21.00
Total Acreage of Wetlands Within ROW	30.93	30.93	31.39	30.93
RANKING				

Evaluation Criteria	Alignment A6572	Alignment A6573	Alignment A6574	Alignment A6575
Floodplain Impacts				
Number of FEMA Floodplain Crossings	10.00	9.00	9.00	11.00
Associated Length (meters) of Floodplain Crossings	22835.27	22649.48	22328.48	26346.83
Total Acreage of FEMA Floodplain Crossings	169.89	169.19	166.79	185.21
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	16.00	16.00	18.00	18.00
Count of Species along ROW (Adjacent Buffer-ROW)	0.00	0.00	0.00	0.00
Sensitive Habitat Acreage (ROW)	20.15	17.63	17.63	20.15
Net Sensitive Habitat Acreage (Adjacent -ROW)	71.03	52.83	52.83	71.03
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	11609.00	11609.00	12541.00	25353.00
Low Income Within 1,400' Buffer – 1990 Households	0.00	0.00	0.00	262.00
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	262.88	262.86	283.33	264.20
RANKING				























Evaluation Criteria	Alignment A6572	Alignment A6573	Alignment A6574	Alignment A6575
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00	0.00	0.00	0.00
Number of National Register Resources along ROW	0.00	0.00	0.00	0.00
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	6.95	6.15	6.15	6.95
Total Acreage of Parks/Recreation Areas along ROW	23.56	18.47	18.47	23.56
Incidences of Parks/Recreation Areas in ROW	3.00	1.00	1.00	3.00
Incidences of Parks/Recreation Areas along ROW	0.00	0.00	0.00	0.00
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				

Table 4.1.6D continued
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Tulare to Bakersfield Alignment

Evaluation Criteria	Alignment A6577			
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	VHS 25.22 minutes Mag 22.76 minutes			
	N/A			
Length	81.14 miles 130.58 km			
	N/A			
Population/Employment Catchment	Not Applicable			
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	Not Applicable			
<i>Minimize Operating and Capital Costs.</i>				
Length	New ROW			
				
Operational Issues	New ROW			
				

Evaluation Criteria	Alignment A6577			
Construction Issues	New ROW Kern River crossing			
				
Capital Cost	Moderate costs			
				
Right-of-Way Issues/Cost	New ROW Kern River crossing			
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses within adjacent buffers (Residences, Institutions, Recreation, Parks, and Open Space)	18.78			
RANKING				
Visual Quality Impacts				
Scenic Corridor and River Crossings	0.00			
RANKING				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream/Lake Crossings	13.00			
Number of Wetland Crossings	25.00			
Total Acreage of Wetlands Within ROW	32.76			
RANKING				

Evaluation Criteria	Alignment A6577			
Floodplain Impacts				
Number of FEMA Floodplain Crossings	13.00			
Associated Length (meters) of Floodplain Crossings	24910.17			
Total Acreage of FEMA Floodplain Crossings	182.11			
RANKING				
Threatened & Endangered Species Impacts				
Count of Species w/in ROW	21.00			
Count of Species along ROW (Adjacent Buffer-ROW)	0.00			
Sensitive Habitat Acreage (ROW)	39.19			
Net Sensitive Habitat Acreage (Adjacent -ROW)	144.51			
RANKING				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	12541.00			
Low Income Within 1,400' Buffer – 1990 Households	0.00			
RANKING				
Farmland Impacts				
Total Acreage of Important Farmlands Within ROW (Prime, Unique, and Statewide Importance)	385.34			
RANKING				

Evaluation Criteria	Alignment A6577			
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within ROW	0.00			
Number of National Register Resources along ROW	0.00			
RANKING				
Parks & Recreation/Wildlife Refuge Impacts				
Total Acreage Parks/Recreation Areas in ROW	6.15			
Total Acreage of Parks/Recreation Areas along ROW	18.47			
Incidences of Parks/Recreation Areas in ROW	1.00			
Incidences of Parks/Recreation Areas along ROW	0.00			
RANKING				
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				



Least Favorable

Most Favorable

4.1.7 Bakersfield

This segment comprises stations in Bakersfield. Connections with the Bakersfield to Los Angeles region are addressed in the Bakersfield to Los Angeles High Speed Train Screening Evaluation. In the Bakersfield area, seven station sites have been evaluated. All four general routes arrive in the Bakersfield area as high-speed alternatives, with the E99 alignment flowing into the SP route north of the City of Bakersfield. All stations considered in the evaluation can be served on high-speed alignments, except two, which are served by the existing BNSF alignment only via a stopping track approach.

A. THE BAKERSFIELD STATION SITES ARE:

S71 Bakersfield Truxton

The S71 Bakersfield Truxton station is located just to the east of the new Amtrak station in downtown Bakersfield near Truxton Avenue and R Street. The high-speed station could have one of two orientations, depending on the alignment chosen. Using the existing BNSF route, as Amtrak does, would yield an east-west orientation. Using a new urban alignment along Union Avenue would call for a north-south orientation that crosses the existing BNSF tracks perpendicularly. However, recent planning decisions by the City of Bakersfield have moved the urban corridor from Union Avenue to Cottonwood Avenue to the east.

S72 Bakersfield Golden State

The S72 Bakersfield Golden State station would be located along the existing UP (SP) route that parallels Golden State Avenue in the northern part of downtown Bakersfield. The prime site would be in the vicinity of M Street, but the site could move to the west as far as F Street.

S73 Bakersfield Airport

The S73 Bakersfield Airport station would be located along the existing UP (SP) route just west of SR 99 and south of 7th Standard Road. The site is directly across the freeway from the Bakersfield Airport.

S74 Bakersfield West

The S74 Bakersfield West station would be located on the W99 alignment in the general vicinity of Stockdale Highway and Nord Avenue. The exact site would depend on the final routing of the W99 alignment along the western edge of the built-up areas of Bakersfield. The site is considerably farther west than the earlier conceptual west side station near Allen Road, due to the extensive suburban development of that area.

S75 Bakersfield East

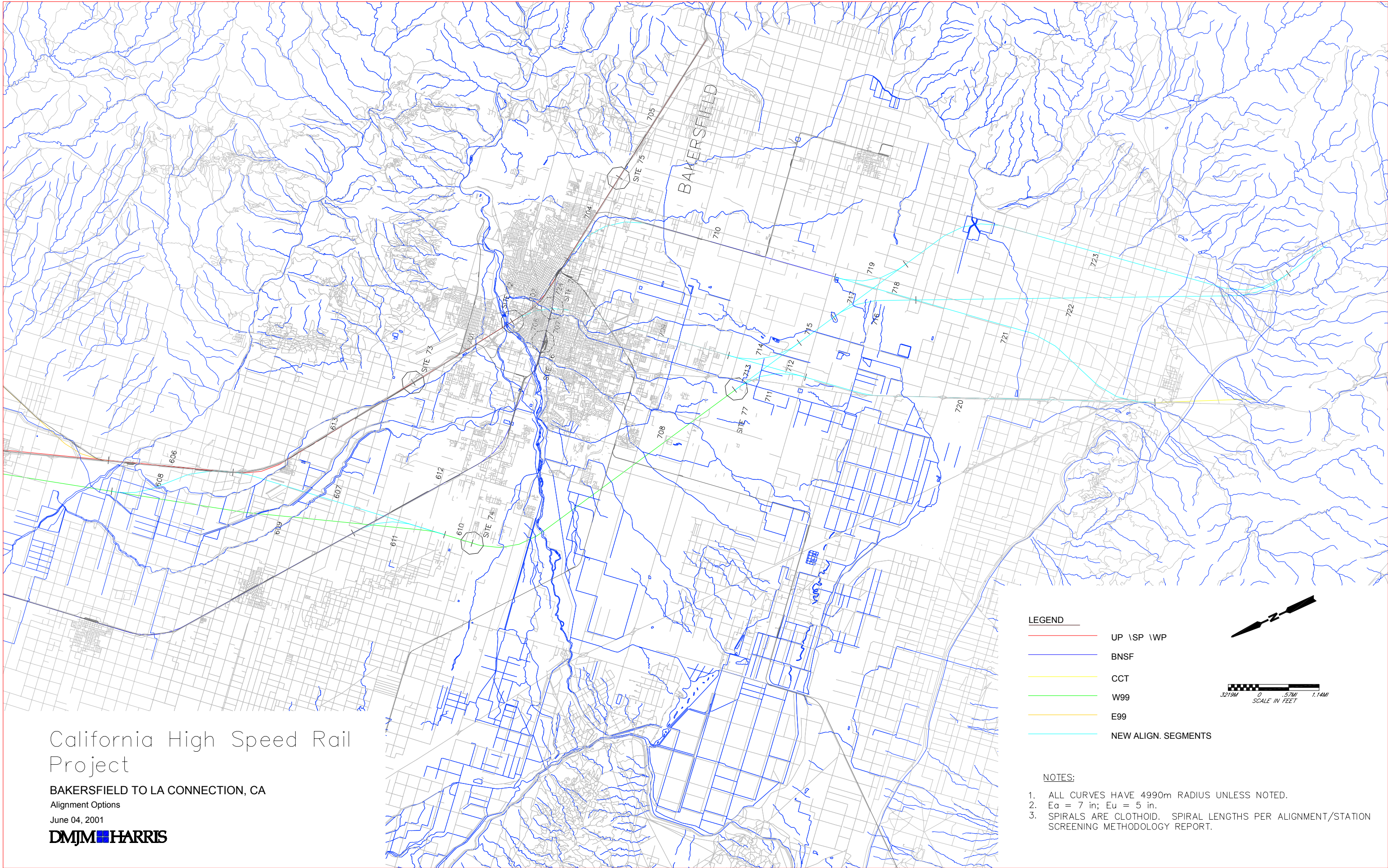
The S75 Bakersfield East station would be located on the UP (SP) Tehachapi route toward Mojave. The site is north of the SR 58 freeway near the intersection of Edison Highway and Edison Road, although the exact location could be moved to the east or the west, depending on local conditions.

S76 Old Amtrak

The S76 Old Amtrak station is located along the BNSF route near freight yards just south of Truxton Avenue near K Street and Chester Avenue. The area was formerly Amtrak's terminal station for the San Joaquin service until the move to the S71 Bakersfield Truxton site.

S77 Bakersfield South

The S77 Bakersfield South station would be located along the W99 route at a location west of the SR 99 Freeway and south of Taft Highway.



California High Speed Rail Project

BAKERSFIELD TO LA CONNECTION, CA

Alignment Options

June 04, 2001

DMJM HARRIS

B. STATION SCREENING CONSIDERATIONS

S71 Bakersfield Truxton

Planning: The S71 Bakersfield Truxton site coincides with the new Amtrak station. The HSR station fits into the City of Bakersfield's plans for downtown redevelopment of a central core of attractions and land uses. It is one of three sites recommended for further study by local stakeholders. The City's most recent group of transportation alternatives for the area has shifted a planned downtown freeway corridor eastward away from Union Avenue to Cottonwood Avenue. This change makes a high-speed alignment to the station site less feasible.

Engineering: The station on this site would have one of two orientations: east-west along the present BNSF and Amtrak corridor, which can be served by a stopping-track alignment, or north-south along the Union Avenue corridor, which could have been served by a high-speed track.

Cost: High costs are expected due to dense urban surroundings and new access alignments.

Environmental: The Truxton Station site would have minor conflicts with existing land uses. While there are no cultural resources, park and recreational areas, important farmlands, threatened and endangered species, or water resources in this station area, environmental justice would be a major consideration.

S72 Bakersfield Golden State

Planning: The S72 Golden State site is located at the northern edge of downtown Bakersfield along the existing SP/UP rail route. It is also one of three sites recommended for further study by local stakeholders. Current lower value uses of the site would be upgraded by the City to encourage redevelopment with the HSR station as anchor. The site lies along a major arterial highway, which would provide access from the region.

Engineering: The station site is a constrained location that would require some land assembly and demolition of existing buildings. A standard configuration station could be accommodated in the area on a high-speed alignment running to the east before turning south toward Los Angeles regional connections.

Cost: The station would incur high costs, due to denser urban surroundings.

Environmental: The Golden State Station would have moderate conflicts with existing land uses and has the potential to impact existing visual quality for the surrounding uses. Impacts to cultural resources, park and recreational areas, important farmlands, and threatened and endangered species would be minimal. The 100-year floodplain and water resources are extensive and would be a major consideration.

S73 Bakersfield Airport

Planning: The S73 Bakersfield Airport site lies along the existing SP route across the SR 99 Freeway from Meadows Field. This is the third of three sites recommended for further study by local stakeholders. Airport facilities are scheduled for rebuilding in the next few years, offering some coordination opportunities. The HSR station site would lie at the northern end of the metropolitan area and away from the downtown, but would serve areas oriented to the SR 99 Freeway. The nearest freeway interchange connects to 7th Standard Road, which is planned to be upgraded to expressway and later freeway standards. Some ancillary services, such as car rental, could be shared with airport users through a cooperative shuttle service.

Engineering: A four-track standard configuration station could be built at the site.

Cost: The standard suburban station would incur moderate costs.

Environmental: The Airport Station would have minimal conflicts with existing land uses and relatively few users would be visually affected in the area. Water resources, floodplains, environmental justice communities, cultural resources, or parks and recreation areas are not within the station area. The Airport site would, however, have a moderate impact on farmlands and disturb threatened and endangered species.

S74 Bakersfield West

Planning: The S74 Bakersfield West station site would lie on a W99 alignment at the current limits of suburban development to the west of Bakersfield. This is a distance of 10.8 miles from downtown and 8.4 miles from the SR 99 Freeway.

Engineering: The site is no longer linked to the existing BNSF rail route as in earlier studies but stands only on a high-speed W99 alignment around Bakersfield. The four-track standard configuration station shows no construction complications.

Cost: The standard suburban station would incur moderate costs.

Environmental: The West Station would have major conflicts with existing land uses and create visual impacts for nearby viewers. The station site also contains extensive farmlands and threatened and endangered species are known to occur in the vicinity. However, there are no water resources, floodplains, environmental justice issues, cultural resources, or park and recreation areas.

S75 Bakersfield East

Planning: The S75 Bakersfield East site is located along the SP/UP line to the Tehachapi grade. The site is not in the path of Bakersfield development trends. The City of Bakersfield does not plan to connect the area to city services.

Engineering: The site poses no major obstacles to the construction of a four-track standard configuration station.

Cost: The standard suburban station would incur moderate costs.

S76 Bakersfield Old Amtrak

Planning: The S76 Old Amtrak station site would occupy the site superseded by the new Amtrak station near the S71 Truxton site. While this site offers room for a HSR station, the downtown focus of the site is weaker than for the new S71 Truxton site and the interaction with BNSF yard operations would require additional mitigation.

Engineering: The site is only accessible on a stopping track along the existing BNSF rail line from the Hanford area.

S77 Bakersfield South









Planning: The S77 Bakersfield South site lies at the crossing of the W99 alignment and the SR 99 Freeway in the vicinity of Taft Road. The site is about 6 miles south of downtown.

Engineering: The W99 alignment follows a pipeline easement at this point. The site poses no major obstacles to the construction of a four-track standard configuration station.

















Cost: The standard suburban station would incur moderate costs.
















Environmental: The South Station would have minor conflicts with existing land uses and minimal impact to existing visual quality. No impacts to water resources, environmental justice communities, cultural resources, or park or recreation areas would be expected. On the other hand, most of the site lies within the prime, unique, or statewide important farmland, and four threatened and endangered species have been counted in the station area.

Table 4.1.7C
Sacramento to Bakersfield - High-Speed Train Station Evaluation Matrix
Bakersfield Stations

Evaluation Criteria	Station S71 Bakersfield Truxton	Station S72 Bakersfield Golden State	Station S73 Bakersfield Airport	Station S74 Bakersfield West
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Population/Employment Catchment				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	<ul style="list-style-type: none"> Downtown location. Freeway access: SR99 is located about 2 miles west of site. SR58 is located about 1.5 miles south of site. Street access: Site has good north-south and east-west connections via the existing downtown street grid. Parking: Land is available for the construction of parking structures. Transit: Site could be served by expansion of existing transit routes. Other rail: New Amtrak station is at same location and is sited to the north of the existing BNSF tracks. 	<ul style="list-style-type: none"> Downtown location. Freeway access: Route 204 turns into an arterial in the vicinity of the station site. Site is also in close proximity to Route 178. Street access: Site has good north-south and east-west connections via the existing downtown street grid. Parking: Parcels could be assembled for the construction of parking structures. Transit: Site could be served by expansion of existing transit routes. Other rail: None. 	<ul style="list-style-type: none"> Outlying location. Freeway access: Site is located just west of SR99. Street access: Site is located just south of Seventh Standard Road and also has existing north-south connections to the downtown core. Parking: Land is available for provision of parking facilities. Transit: Would require provision of new transit links to downtown and airport. Other rail: None. 	<ul style="list-style-type: none"> Outlying location. Freeway access: Site would be located in proximity to Stockdale Highway, which connects to I-5. Site would also be located in close proximity to potential new east-west highway currently under study. Street access: Site would be located in general vicinity of Stockdale Highway and Nord Avenue. Parking: Land is available for provision of parking facilities. Transit: Would require provision of new transit links to downtown and airport. Other rail: None. 

Evaluation Criteria	Station S71 Bakersfield Truxton	Station S72 Bakersfield Golden State	Station S73 Bakersfield Airport	Station S74 Bakersfield West
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Operational Issues	<ul style="list-style-type: none"> Accessing the site via the existing BNSF alignment would yield an east-west station orientation and a stopping track configuration. Accessing the site via a new alignment along Union Avenue would yield a north-south station orientation and allow for a high-speed, through track configuration. Railroad interactions: Either alignment configuration would need to allow for BNSF and Amtrak movements through the site. 	<ul style="list-style-type: none"> Alignment would parallel existing UP and would allow for a high-speed, through track station configuration. Compatibility/interface issues with existing freight along UP. Connection from UP alignment to BNSF alignment to the southeast of the station site may be problematic. Train speed through downtown area may be constrained for environmental reasons. 	<ul style="list-style-type: none"> Alignment would parallel existing UP and would allow for a high-speed, through track station configuration. Compatibility/interface issues with existing freight along UP. 	<ul style="list-style-type: none"> New alignment would allow for a high-speed, through track station configuration.
Construction Issues	<ul style="list-style-type: none"> High water table – irrigation canals cross site. Union Avenue alignment would have major impacts upon existing development along the corridor. 	<ul style="list-style-type: none"> High water table. Would require parcel assembly and demolition of existing structures. Constrained urban site. 	<ul style="list-style-type: none"> Relatively straightforward, open-field construction. High water table. 	Straightforward, open-field construction at station site.
Capital Cost	Relatively high.	Relatively high.	Moderate.	Moderate

Evaluation Criteria	Station S71 Bakersfield Truxton	Station S72 Bakersfield Golden State	Station S73 Bakersfield Airport	Station S74 Bakersfield West
Right-of-Way Issues/Cost	<ul style="list-style-type: none"> Adjacent to existing Amtrak station site in downtown location. Site purchase price is expected to be high. 	<ul style="list-style-type: none"> Downtown site, which would require parcel assembly and demolition of existing low-end land uses. Site purchase price is expected to be high.	Open-field construction. Site purchase price is expected to be low.	Open-field construction. Site purchase price is expected to be moderate to high.
				
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	23.39	57.48	13.71	96.67
Primary Land Uses (acreage) within station area	Commercial (87); Industrial (158); Mixed Use (139); Residential (76)	Commercial (81); Industrial (83); Institutional (107); Open Space (74); Residential (105)	Commercial (363); Residential (69)	Residential (486)
Rank				
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	23.39	57.48	13.71	96.67
Number of scenic corridor and scenic river crossings	0	0	0	0
Rank				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	0	1	0	0
Number of Wetland Crossings	0	0	0	0
Total Acreage of Wetlands within Station Area	0	0	0	0
Rank				

Evaluation Criteria	Station S71 Bakersfield Truxton	Station S72 Bakersfield Golden State	Station S73 Bakersfield Airport	Station S74 Bakersfield West
Floodplain Impacts				
Number of FEMA Floodplain Crossings	1	1	0	0
Total Acreage of FEMA Floodplain Crossings within Station Area	6.19	58.39	0	0
Rank				
Threatened & Endangered Species Impacts				
Count of Species	0	0	1	2
Acreage of Sensitive Habitat within Station Area	0	1.89	0	0
Rank				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	5361	0	0	0
Low Income Within 1,400' Buffer – 1990 Households	222	0	0	0
Rank				
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	0	0	244.52	405.68
Rank				







Evaluation Criteria	Station S71 Bakersfield Truxton	Station S72 Bakersfield Golden State	Station S73 Bakersfield Airport	Station S74 Bakersfield West
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0	0	0	0
Rank	●	●	●	●
Parks & Recreation/Wildlife Refuge Impacts				
Count of Parks/Recreation Areas	0	4	0	0
Total Acreage Parks/Recreation Areas in Station Area	0	25.47	0	0
Rank	●	○	●	●
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				



























Least Favorable

Most Favorable

Table 4.1.7C continued
Sacramento to Bakersfield - High-Speed Train Alignment Evaluation Matrix
Bakersfield Stations

Evaluation Criteria	Station S75 Bakersfield East	Station S76 Bakersfield Old Amtrak	Station S77 Bakersfield South	
<i>Maximize Ridership/Revenue Potential.</i>				
Travel Time	Not Applicable	Not Applicable	Not Applicable	
Length	Not Applicable	Not Applicable	Not Applicable	
Population/Employment Catchment				
				
<i>Maximize Connectivity and Accessibility.</i>				
Intermodal Connections	<ul style="list-style-type: none"> • Outlying location. • Freeway access: Site would be located immediately north of Route 58 freeway near the intersection of Edison Highway and Edison Road. • Street access: Site would be accessible via Edison Highway and Edison Road. • Parking: Land is available for provision of parking facilities. • Transit: Would require provision of new transit links to downtown and airport. • Other rail: None. 	<ul style="list-style-type: none"> • Near downtown location. • Freeway access: SR99 is located less than one mile west of site. SR58 is located about 1.5 miles south of site. • Street access: Site has good north-south and east-west connections via the existing downtown street grid. • Parking: Land is available for the construction of parking structures. • Transit: Site could be served by expansion of existing transit routes. • Other rail: This site was formerly Amtrak's terminal station for San Joaquin service until the move to S71 Bakersfield Truxton site. 	<ul style="list-style-type: none"> • Outlying location. • Freeway access: Site would be located immediately west of SR99. Site would also be located in close proximity to Taft Highway. • Street access: Site would be located west of SR99 and south of Taft Highway. • Parking: Land is available for provision of parking facilities. • Transit: Would require provision of new transit links to downtown and airport. • Other rail: None. 	
				

Evaluation Criteria	Station S75 Bakersfield East	Station S76 Bakersfield Old Amtrak	Station S77 Bakersfield South	
<i>Minimize Operating and Capital Costs.</i>				
Length	Not Applicable	Not Applicable	Not Applicable	
Operational Issues	<ul style="list-style-type: none"> Alignment would parallel existing UP and would allow for a high-speed, through track station configuration. Compatibility/interface issues with existing freight along UP. 	<ul style="list-style-type: none"> Access to the site would be via the existing BNSF alignment and would yield an east-west station orientation and a stopping track configuration. Railroad interactions: The alignment and station configuration would need to allow for BNSF and Amtrak movements through the site. 	<ul style="list-style-type: none"> New alignment would allow for a high-speed, through track station configuration. 	
				
Construction Issues	Straightforward, open-field construction at station site.	<ul style="list-style-type: none"> High water table. Existing yard but would require demolition of some existing structures. 	Straightforward, open-field construction at station site.	
				
Capital Cost	Low.	Relatively high.	Moderate	
				
Right-of-Way Issues/Cost	<ul style="list-style-type: none"> Open-field construction. Site purchase price is expected to be low. No existing utilities. 	On site of old Amtrak station.	<ul style="list-style-type: none"> Open agricultural land on new alignment. Site purchase price is expected to be moderate to high. 	
				

Evaluation Criteria	Station S75 Bakersfield East	Station S76 Bakersfield Old Amtrak	Station S77 Bakersfield South	
<i>Maximize Compatibility with Existing and Planned Development.</i>				
Land Use Compatibility and Conflicts				
Percent of Conflicting Existing Land Uses (Residences, Institutions, Recreational Areas, and Open Space) within Station Area	31.11	58.74	0	
Primary Land Uses (acreage) within station area	Commercial (229); Farmlands/Agriculture (64); Residential (155)	Commercial (48); Institutional (52); Residential (232); Transportation (107)	Farmlands/Agriculture (490)	
Rank				
Visual Quality Impacts				
Percent of Visually Sensitive Existing Land Uses (Residential, Institutional, Recreational Areas, and Open Space)	31.11	58.74	0	
Number of scenic corridor and scenic river crossings	0	0	0	
Rank				
<i>Minimize Impacts to Natural Resources.</i>				
Water Resources Impacts				
Number of Natural Stream	0	0	0	
Number of Wetland Crossings	0	0	0	
Total Acreage of Wetlands within Station Area	0	0	0	
Rank				
Floodplain Impacts				
Number of FEMA Floodplain Crossings	1	0	0	
Total Acreage of FEMA Floodplain Crossings within Station Area	24.40	0	0	
Rank				

Evaluation Criteria	Station S75 Bakersfield East	Station S76 Bakersfield Old Amtrak	Station S77 Bakersfield South	
Threatened & Endangered Species Impacts				
Count of Species	4	0	1	
Acreage of Sensitive Habitat within Station Area	0	0	0	
Rank				
<i>Minimize Impacts to Social and Economic Resources.</i>				
Environmental Justice Impacts (Demographics)				
Minority Within 1,400' Buffer – 1990 Population	0	80	0	
Low Income Within 1,400' Buffer – 1990 Households	0	0	0	
Rank				
Farmland Impacts				
Total Acreage of Important Farmlands Within Station Area (Prime, Unique, and Statewide Importance)	387.44	0	0	
Rank				
<i>Minimize Impacts to Cultural Resources.</i>				
Cultural Resources Impacts				
Number of National Register Resources Within Station Area	0	0	0	
Rank				

Evaluation Criteria	Station S75 Bakersfield East	Station S76 Bakersfield Old Amtrak	Station S77 Bakersfield South	
Parks & Recreation/Wildlife Refuge Impacts				
Count of Parks/Recreation Areas	0	0	0	
Total Acreage Parks/Recreation Areas in Station Area	0	0	0	
Rank	●	●	●	
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>				
Soils/Slope Constraints				
Not a Distinguishing Factor				
Seismic Constraints				
Not a Distinguishing Factor				
<i>Maximize Avoidance of Areas with Potential Hazardous Materials.</i>				
Hazardous Materials/Waste Constraints				
Not a Distinguishing Factor				



Least Favorable

Most Favorable

C. ALIGNMENT SCREENING CONSIDERATIONS

All four major route alignments can be used to reach the approaches to the Bakersfield area. All station sites are accessible from each.

The E99 alignment in this segment differs from the others in the amount of hilly geography on its route. The Central Valley begins to narrow at the base of the Sierra foothills and the Tehachapi Mountains. South of Bakersfield the Central Valley widens again. The rolling terrain increases construction costs, operating costs and environmental impacts.

All station sites in Bakersfield can be located on high-speed alignments except S76 Old Amtrak and S71 Bakersfield Truxton in an east-west configuration. The urban sites, S71 Bakersfield Truxton in a north-south configuration and S72 Bakersfield Golden State will require extensive engineering solutions to accomplish this goal, which has been made harder at S71 Bakersfield Truxton by recent decisions to move a north-south urban highway alignment to the east of the site.

The W99 alignment, without stations at either S74 Bakersfield West or S77 Bakersfield South, could serve as a two-track high-speed through route for nonstop trains to the I-5 Grapevine or Comanche Point connections to the Los Angeles region. The two-track stopping track alignments for the urban stations would present lesser engineering and environmental challenges.

Three connection points for routes between Bakersfield and the Los Angeles area have been established between the two regional study teams. They are the I-5 Grapevine area, the Comanche Point area and an alignment following the Union Pacific mainline toward Mojave. Refer to Bakersfield to Los Angeles High-Speed Train Screening Evaluation.

5.0 REFERENCES

- California High-Speed Rail Authority. *Building a High-Speed Train System for California, Final Business Plan*. June 2000.
- Parsons Brinckerhoff. *Los Angeles – Bakersfield High-Speed Ground Transportation Preliminary Engineering Feasibility Study Final Report*. Prepared for California Department of Transportation (Caltrans), December 1994.
- Parsons Brinckerhoff. *Task 1.5.2 – High-Speed Train Alignments/Stations Screening Evaluation Methodology*. Prepared for California High-Speed Rail Authority, May 2001.
- Parsons Brinckerhoff. *California High-Speed Rail Corridor Evaluation - Environmental Summary*. Prepared for California High-Speed Rail Authority, April 2000.
- Parsons Brinckerhoff. *California High-Speed Rail Corridor Evaluation*. Prepared for California High-Speed Rail Authority, December 1999.
- Parsons Brinckerhoff. *California High-Speed Rail Corridor Evaluation and Environmental Constraints Analysis*. California Intercity High-Speed Rail Commission, June 1996.

6.0 PERSONS AND AGENCIES CONSULTED

The following is a list of people contacted during the preparation of this report. The persons and agencies mentioned are in addition to those who attended or commented at the four Town Hall meetings in February 2001 and the four Scoping Meetings in April and May 2001. A summary of the discussion items in the interviews enumerated below can be found in the Sacramento to Bakersfield Scoping Report, Section 2.2, Summary of Other Involvement Activities.

Corridor Briefings, Sacramento, February 21, 2001. Interviews conducted by Carrie Pourvahidi, CHSRA; David Shpak, PBQD; Al Witzig, DMJM+Harris; Kuldip Chohan, StrategiComm:

Dalldorf, Chuck. Chief of Staff, Sacramento Mayor's Office
Hough, Ken. Director of Planning, Sacramento Council of Governments
Thomas, Bob. City Manager. City of Sacramento
Tuttle, Marty. Executive Director. Sacramento Council of Governments
Williams, Brian. Executive Director. Sacramento Transportation Authority

Corridor Briefings, Sacramento, April 19, 2001. Interviews conducted by Carrie Pourvahidi, CHSRA; David Shpak, PBQD; Al Witzig, DMJM+Harris; Kuldip Chohan, StrategiComm:

Beach, Cameron. Sacramento Regional Transit
Blumberg, Paul. Planning Department. City of Sacramento
Butler, David. Sacramento Metropolitan Chamber of Commerce
Cohn, Steve. Council Member. City of Sacramento
Johnson, Muriel. Supervisor, County of Sacramento
Montemayor, Mark. Mayor, City of West Sacramento
Nottoli, Don. Supervisor. County of Sacramento

Corridor Briefings, Stockton, March 27, 2001. Interviews conducted by Carrie Pourvahidi, CHSRA; Al Witzig, DMJM+Harris; Kuldip Chohan, StrategiComm:

Addington, Ron. San Joaquin County Partnership and Business Council
Kim Kloebe, San Joaquin Council of Governments
Massey, Peggy. Downtown Stockton Alliance
Mortensen, Stacey. Executive Director. Altamont Commuter Express (ACE)
Nguyen, Dianne. San Joaquin Council of Governments
Pennino, Phil. Chairman. San Joaquin County Rail Commission (Mayor of Lodi)
Pinkerton, Steve. Director. Stockton Housing and Redevelopment Department
Podesto, Gary. Mayor. City of Stockton
Sieglock, Jack. Supervisor. San Joaquin County
Storey, Roger. Deputy City Manager. City of Stockton
Wilhoit, Doug. Executive Director. Greater Stockton Chamber of Commerce

Corridor Briefings, Modesto, March 26, 2001. Interviews conducted by Carrie Pourvahidi, CHSRA; Al Witzig, DMJM+Harris; Kuldip Chohan, StrategiComm:

Blom, Nick. Supervisor. Stanislaus County
Dickson, Gary. Executive Director. Stanislaus County Council of Governments
Gaekle, George. Rail Passenger Advisor. Stanislaus County Board of Supervisors
Sabatino, Carmen. Mayor. City of Modesto

Speck, Charline. President. Stanislaus County Economic Development Corporation
Whiteside, Carol. President. Great Valley Center
Wilson, Reagan. CEO. Stanislaus County

Corridor Briefing, Modesto, January 4, 2001. Interview conducted by Carrie Pourvahidi, CHSRA; John Barna, CHSRA; Al Witzig, DMJM+Harris:
Whiteside, Carol. President, Great Valley Center

Corridor Briefings, Merced, March 21, 2001. Interviews conducted by Carrie Pourvahidi, CHSRA; David Shpak, PBQD; Al Witzig, DMJM+Harris; Vern Crow, Panagraph; Larry Pickett, L. M. Pickett Associates:

Badgley, Bob. Campus Infrastructure Manager. UC Merced
Brown, Jesse. Executive Director. Merced Council of Governments
Jackson, Fred. Urban Planning/Development Specialist. UC Merced
Lesch, Jack. Planning Department. City of Merced
Stroud, Steve. City Engineer. City of Merced
Trevino, Elaine. President and CEO. Merced Economic Development Corporation
Wallace, Bud. Owner. Wallace Transportation

Corridor Briefings, Fresno, March 6, 2001. Interviews conducted by Carrie Pourvahidi, CHSRA; David Shpak, PBQD; Al Witzig, DMJM+Harris; Vern Crow, Panagraph; Larry Pickett, L. M. Pickett Associates:

Goodwin, Barbara. Executive Director. Council of Fresno Area Governments
Thompson, Clark. Planning Coordinator. Council of Fresno Area Governments
Machado, Richard. Former President. Fresno Economic Development Corporation
Mehas, Dr. Peter. Superintendent, Fresno County Schools
Montero, Roger. Deputy Mayor. City of Fresno
Evans, Bill. Acting CEO. Central Valley Economic Development Corporation
Quiring, John. Former President. Fresno Economic Development Corporation
Levy, Joe. CEO. Gottschalks Department Stores
DeMers, Don, Administrator, Fresno County Transportation Authority

Corridor Briefings, Fresno, March 20, 2001. Interviews conducted by Carrie Pourvahidi, CHSRA; David Shpak, PBQD; Al Witzig, DMJM+Harris; Vern Crow, Panagraph; Larry Pickett, L. M. Pickett Associates:

Armstrong, Harry. Mayor. City of Clovis
Brogan, Richard. Planning Commission. City of Fresno
Johanssen, Dick. Owner. Johanssen Transport
Koligian, Deran. Supervisor. Fresno County
McIntyre, Martin. Public Works Director. City of Fresno
Nankiville, Deborah. Executive Director. Fresno Business Council
Palomino, Roger. Executive Director. Fresno Co. Economic Opportunities Commission
Witte, Jeff. Deputy City Manager. City of Clovis

Corridor Briefing, Fresno, March 26, 2001. Interview conducted by Carrie Pourvahidi, CHSRA; David Shpak, PBQD; George Minter, Greer/Dailey/Minter; Vern Crow, Panagraph:

Anderson, Susan. Supervisor. Fresno County
Arambula, Juan. Supervisor. Fresno County
Waterston, Bob. Supervisor. Fresno County

Corridor Briefings, Tulare and Kings Counties, February 27, 2001. Interviews conducted by Carrie Pourvahidi, CHSRA; David Shpak, PBQD; Al Witzig, DMJM+Harris; Gene Tackett, Tackett Consulting Services; Larry Pickett, L. M. Pickett Associates:

Carey, Peter. Former Mayor. City of Visalia
Finney, George. Tulare County Association of Governments
Fussell, Britt. Public Works Director. City of Visalia
King, Terri. Kings County Association of Governments
Mills, Dennis. Kings County Association of Governments
Przybylski, Chuck. Planning Agency. Tulare County
Saldana, Paul. Tulare County Economic Development Corporation
Salomon, Steve. City Manager. City of Visalia
Stocker, Bob. Tulare County Association of Governments
Wendt, Eddie. Tulare County Association of Governments
Zumwalt, Bill. Kings County Association of Governments

Corridor Briefing, Hanford, April 6, 2001. Presentation and discussion conducted by Al Witzig, DMJM+Harris:

Delegates from COGs and county government to the San Joaquin Valley Rail Association

Corridor Briefings, Bakersfield, February 2, 2001. Interviews conducted by Carrie Pourvahidi, CHSRA; David Shpak, PBQD; Al Witzig, DMJM+Harris; Cathal Ridge, DMJM+Harris; Gene Tackett, Tackett Consulting Services; Larry Pickett, L. M. Pickett Associates:

Blackburn, Gary. President. Kern Transportation Foundation
Brummet, Ron. Executive Director. Kern COG
Drew, Joseph. President. International Trade and Transportation Center
Ebel, Pat. Transportation Development Engineer. Kern County RMA
Hade, Jason. Planner. Kern COG
Lackey, Chuck. Director, Engineering and Survey Services Dept. Kern Co. RMA
Lusich, Tony. Kern Transportation Foundation
Mills, Dale. Kern Transportation Foundation
Moland, Chester. Kern Transportation Foundation
Pope, Craig. Director, Roads Department, Kern County Resource Management Agency
Price, Dave. Director. Kern County Resource Management Agency
Ramming, Arnold. Public Works Department. City of Bakersfield
Silver, Howard. Kern Transportation Foundation
Watson, Ray. Board Member. Downtown Business Association

Corridor Briefings, Bakersfield, March 16, 2001. Interviews conducted by Carrie Pourvahidi, CHSRA; Al Witzig, DMJM+Harris; Cathal Ridge, DMJM+Harris; Gene Tackett, Tackett Consulting Services; Larry Pickett, L. M. Pickett Associates:

Carter, Doug. President. Kern County Farm Bureau

Collins, Pat. President. Kern Economic Development Corporation
Hall, Harvey. Mayor. City of Bakersfield
Hardistry, Jack. Development Services Director, City of Bakersfield
Hodge, Loron. Executive Director. Kern County Farm Bureau
Kilpatrick, Dave. Chairman. Bakersfield Chamber of Commerce
Larwood, Pauline. Former Supervisor. Kern County
LaRochelle, Jack. Acting Public Works Director, City of Bakersfield
Stinson, John. Assistant City Manager. City of Bakersfield

Corridor Briefing, Long Beach, April 5, 2001. Discussion conducted by Al Witzig, DMJM+Harris:
Ruddell, Herman. Board Member. Bakersfield Downtown Business Association

7.0 PREPARERS

Albert Witzig, AICP
Senior Planner

MPA-Urban and Regional Planning, Princeton University, 20 years transportation planning and rail transit implementation experience

- Regional Project Manager

Chris Poli, PE
Project Manager

BS Engineering, Duke University, 14 years rail and highway/roadway design and civil site engineering

- Deputy Project Manager
- Alignment Task Leader

David I. Webb
Senior Architect

Dip Arch Thames (Masters) in Architecture, Thames Polytechnic, London, England. 30 years of Architectural Experience, 15 years Station design experience, Architectural License UK (1973-78) Nigeria (1978-80) California (1982- present)

- Station Location Task Leader

Cathal Ridge, AICP
Planner

MS Transportation, Massachusetts Institute of Technology, 7 years transportation project development and planning experience

- Station Locations

Thomas Pavlick, PE
Civil Engineer

BSCE Civil Engineering, University of Delaware, 10 years experience in railroad track, structures and facilities construction and design

- Alignment engineering

Javier Aguilar
Planner

MA Urban Planning, University of California, Los Angeles, 5 years experience in socioeconomic analysis, Geographic Information Systems and transportation modeling

- GIS systems

Rod Jeung, AICP
Technical Director

MRP Masters in Urban and Regional Planning, Cornell University, 20 years environmental planning and NEPA/CEQA compliance experience

- Environmental Team Manager

Fritts Golden, AICP
Technical Director

MRP Masters in Regional Planning, University of Pennsylvania, has 28 years of CEQA/NEPA experience

- Environmental analysis

Brad Brewster
Environmental Planner

MUP Masters in Urban Planning, Certificate in Urban Design, University of Washington, 8 years CEQA/NEPA experience.

- Environmental task management

Binu Chandy
Environmental Planner

MEP Masters in Environmental Planning and Bachelors in Civil Engineering from India, 6 years experience in GIS mapping, planning, and NEPA/CEQA experience.

- GIS systems

Nils Johnson GIS Specialist	MEM/MF Master of Environmental Management/Master of Forestry, Duke University, 4 years GIS experience. <ul style="list-style-type: none">• GIS management
Matthew Huisman Manager, GIS Services	BA Earth Sciences, University of California, Santa Cruz, 6 years of experience in designing and managing GIS Applications for natural resource management, environmental planning, and NEPA/CEQA compliance projects. <ul style="list-style-type: none">• GIS systems
Clifford Nale Geologist	BS Bachelors in Engineering Geology, University of California, Los Angeles, 7 years environmental site assessment and remediation experience. <ul style="list-style-type: none">• Environmental analysis
Carla Bagneschi Planner	MUP Masters in Urban Planning, California State University, San Jose, 3 years experience in urban planning. <ul style="list-style-type: none">• Socioeconomic analysis
Kirsten Lawrence Lead GIS Technician	BA Natural Sciences, Saint Anselm College, 3 years GIS experience <ul style="list-style-type: none">• GIS systems
Amanda Schramm Environmental Planner	BA Politics, University of California, Santa Cruz, 4 years CEQA/NEPA experience <ul style="list-style-type: none">• Environmental Planning

APPENDICES

APPENDIX – A

Travel Time Estimates

Sacramento to Stockton

STATION TO STATION ALIGNMENTS

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE (miles) (kilometers)		TIME VHS (minutes)	TIME MAGLEV (minutes)
A1121A	S11 Sacramento Downtown to S21 Stockton Farmington Road via WP	101, 120, 103, 106, 112, 117	49.933	80.359	17.04	14.96
A1121B	S11 Sacramento Downtown to S21 Stockton Farmington Road via SP	105, 118, 107, 114, 116, 117	50.989	82.059	20.41	18.40
A1121C	S11 Sacramento Downtown to S21 Stockton Farmington Road via CCT	105, 119, 108, 114, 116, 117	52.787	84.952	20.90	18.85
A1122A	S11 Sacramento Downtown to S22 Stockton ACE Downtown via WP	101, 120, 103, 106, 113	45.882	73.840	15.94	13.94
A1122B	S11 Sacramento Downtown to S22 Stockton ACE Downtown via SP	105, 118, 107, 114, 115	46.398	74.671	19.16	17.25
A1122C	S11 Sacramento Downtown to S22 Stockton ACE Downtown via CCT	105, 119, 108, 114, 115	48.196	77.564	19.65	17.70
A1123A	S11 Sacramento Downtown to S23 Stockton Airport via WP	101, 120, 103, 106, 113, 201, 204	53.704	86.428	18.07	15.90
A1123B	S11 Sacramento Downtown to S23 Stockton Airport via SP	105, 118, 107, 114, 115, 201, 204	54.220	87.259	21.29	19.21
A1123C	S11 Sacramento Downtown to S23 Stockton Airport via CCT	105, 119, 108, 114, 115, 201, 204	56.018	90.152	21.78	19.66
A1221	S12 Sacramento Curtis Park to S21 Stockton Farmington Road	104, 106, 112, 117	46.880	75.447	16.21	14.19
A1222	S12 Sacramento Curtis Park to S22 Stockton ACE Downtown	104, 106, 113	42.830	68.928	15.11	13.18
A1223	S12 Sacramento Curtis Park to S23 Stockton Airport	104, 106, 113, 201, 204	50.652	81.516	17.24	15.14
A1321	S13 Sacramento Executive Airport to S21 Stockton Farmington Road	102, 103, 106, 112, 117	45.019	72.451	15.70	13.73
A1322	S13 Sacramento Executive Airport to S22 Stockton ACE Downtown	102, 103, 106, 113	40.969	65.932	14.60	12.71
A1323	S13 Sacramento Executive Airport to S23 Stockton Airport	102, 103 106, 113, 201, 204	48.790	78.520	16.73	14.67
A1421A	S14 Sacramento Power In Road to S21 Stockton Farmington Road via SP	107, 114, 116, 117	44.526	71.658	15.57	13.60
A1421B	S14 Sacramento Power In Road to S21 Stockton Farmington Road via CCT	108, 114, 116, 117	46.286	74.490	16.05	14.04
A1422A	S14 Sacramento Power Inn Road to S22 Stockton ACE Downtown via SP	107, 114, 115	39.936	64.270	14.32	12.46

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A1422B	S14 Sacramento Power Inn Road to S22 Stockton ACE Downtown via CCT	108, 114, 115	41.695	67.102	14.80	12.90
A1423A	S14 Sacramento Power Inn Road to S23 Stockton Airport via SP	107, 114, 115, 201, 204	47.757	76.858	16.45	14.41
A1423B	S14 Sacramento Power Inn Road to S23 Stockton Airport via CCT	108, 114, 115, 201, 204	49.517	79.690	16.93	14.85
A1521	S15 Sacramento Freeport West to S21 Stockton Farmington Road	120, 103, 106, 112, 117	44.990	72.404	15.70	13.72
A1522	S15 Sacramento Freeport West to S22 Stockton ACE Downtown	120, 103, 106, 113	40.939	65.885	14.59	12.71
A1523	S15 Sacramento Freeport West to S23 Stockton Airport	120, 103, 106, 113, 201, 204	48.761	78.473	16.72	14.66

Stockton to Modesto

STATION TO STATION ALIGNMENTS

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A2131	S21 Stockton Farmington Road to S31 Modesto Amtrak Briggsmore	206, 208, 210, 213, 215	25.111	40.411	10.27	8.75
A2132	S21 Stockton Farmington Road to S32 Modesto Empire	206, 208, 210, 213, 215, 220	27.209	43.789	10.85	9.27
A2133	S21 Stockton Farmington Road to S33 Modesto SP Downtown	Not Applicable				
A2134	S21 Stockton Farmington Road to S34 Modesto West	Not Applicable				
A2135	S21 Stockton Farmington Road to S35 Modesto East	206, 208, 210, 214, 217, 222	29.000	46.670	11.33	9.72
A2231	S22 Stockton ACE Downtown to S31 Modesto Amtrak Briggsmore	201, 204, 205, 210, 213, 215	31.665	50.960	12.06	10.39
A2232	S22 Stockton ACE Downtown to S32 Modesto Empire	201, 204, 205, 210, 213, 215, 220	33.764	54.338	12.63	10.91
A2233	S22 Stockton ACE Downtown to S33 Modesto SP Downtown	201, 203, 212	30.728	49.453	11.81	10.15
A2234	S22 Stockton ACE Downtown to S34 Modesto West	201, 203, 211	27.685	44.555	10.98	9.39
A2235	S22 Stockton ACE Downtown to S35 Modesto East	201, 204, 205, 210, 214, 217, 222	35.554	57.219	13.12	11.36
A2331	S23 Stockton Airport to S31 Modesto Amtrak Briggsmore	205, 210, 213, 215	23.844	38.373	9.93	8.43
A2332	S23 Stockton Airport to S32 Modesto Empire	205, 210, 213, 215, 220	25.942	41.750	10.50	8.96
A2333	S23 Stockton Airport to S33 Modesto SP Downtown	Not Applicable				
A2334	S23 Stockton Airport to S34 Modesto West	Not Applicable				
A2335	S23 Stockton Airport to S35 Modesto East	205, 210, 214, 217, 222	27.733	44.632	10.99	9.41

Modesto to Merced**STATION TO STATION ALIGNMENTS**

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A3141A	S31 Modesto Amtrak Briggsmore to S41 Merced Castle via BN	220, 304, 307, 314	27.427	44.139	10.91	9.33
A3141B	S31 Modesto Amtrak Briggsmore to S41 Merced Castle via E99	220, 304, 315, 318	27.753	44.665	10.99	9.41
A3142A	S31 Modesto Amtrak Briggsmore to S42 Merced University via BN	220, 304, 307, 314, 402	34.273	55.157	12.77	11.04
A3142B	S31 Modesto Amtrak Briggsmore to S42 Merced University via 399	220, 304, 315, 318, 402	34.600	55.683	12.86	11.12
A3143A	S31 Modesto Amtrak Briggsmore to S43 Merced Municipal Airport via BN	220, 304, 307, 316, 404, 405	36.482	58.712	13.38	11.59
A3143B	S31 Modesto Amtrak Briggsmore to S43 Merced Municipal Airport via E99	220, 304, 315, 318, 403, 404, 405	36.239	58.321	13.31	11.53
A3144A	S31 Modesto Amtrak Briggsmore to S44 Merced SP Downtown via BN	220, 304, 307, 316, 404, 320, 322	37.418	60.219	13.63	11.83
A3144B	S31 Modesto Amtrak Briggsmore to S44 Merced SP Downtown via E99	220, 304, 315, 318, 403, 404, 320, 322	37.175	59.828	13.56	11.77
A3145A	S31 Modesto Amtrak Briggsmore to S45 Merced Plainsburg via BN	220, 304, 307, 314, 402, 406	44.973	72.377	15.69	13.72
A3145B	S31 Modesto Amtrak Briggsmore to S45 Merced Plainsburg via E99	220, 304, 315, 318, 402, 406	45.300	72.903	15.78	13.80
A3241A	S32 Modesto Empire to S41 Merced Castle via BN	304, 307, 314	25.328	40.762	10.33	8.80
A3241B	S32 Modesto Empire to S41 Merced Castle via E99	304, 315, 318	25.655	41.288	10.42	8.89
A3242A	S32 Modesto Empire to S42 Merced University via BN	304, 307, 314, 402	32.174	51.780	12.20	10.52
A3242B	S32 Modesto Empire to S42 Merced University via E99	304, 315, 318, 402	32.501	52.306	12.29	10.60
A3243A	S43 Modesto Empire to S43 Merced Municipal Airport via BN	304, 307, 316, 404, 405	34.383	55.335	12.80	11.07
A3243B	S43 Modesto Empire to S43 Merced Municipal Airport via E99	304, 315, 318, 403, 404, 405	34.140	54.944	12.74	11.01
A3244A	S32 Modesto Empire to S44 Merced SP Downtown via BN	304, 307, 316, 404, 320, 322	35.320	56.842	13.06	11.30
A3244B	S32 Modesto Empire to S44 Merced SP Downtown via E99	304, 315, 318, 403, 404, 320, 322	35.077	56.451	12.99	11.24

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A3245A	S32 Modesto Empire to S45 Merced Plainsburg via BN	304, 307, 314, 402, 406	42.874	69.000	15.12	13.19
A3245B	S32 Modesto Empire to S44 Merced SP Downtown via E99	304, 315, 318, 402, 406	43.201	69.526	15.21	13.27
A3341	S33 Modesto SP Downtown to S41 Merced Castle	Not Applicable				
A3342	S33 Modesto SP Downtown to S42 Merced University	Not Applicable				
A3343A	S33 Modesto SP Downtown to S43 Merced Municipal Airport via UP	303, 313, 311	36.565	58.846	13.40	11.61
A3343B	S33 Modesto SP Downtown to S43 Merced Municipal Airport via W99	302, 308, 309	39.173	63.043	14.11	12.27
A3344A	S33 Modesto SP Downtown to S44 Merced SP Downtown via SP	303, 313, 321, 322	37.035	59.602	13.53	11.73
A3344B	S33 Modesto SP Downtown to S44 Merced SP Downtown via W99	302, 308, 310, 322	40.403	65.022	14.44	12.57
A3345	S33 Modesto SP Downtown to S45 Merced Plainsburg	Not Applicable				
A3441	S34 Modesto West to S41 Merced Castle	Not Applicable				
A3442	S34 Modesto West to S42 Merced University	Not Applicable				
A3443	S34 Modesto West to S43 Merced Municipal Airport	301, 305, 308, 309	40.154	64.622	14.38	12.51
A3444A	S34 Modesto West to S44 Merced SP Downtown via W99	301, 305, 308, 310, 322	41.384	66.601	14.71	12.82
A3444B	S34 Modesto West to S44 Merced SP Downtown via SP	301, 312, 313, 321, 322	42.174	67.873	14.93	13.02
A3445	S34 Modesto West to S45 Merced Plainsburg	Not Applicable				

Merced to Fresno

STATION TO STATION ALIGNMENTS

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A4151	S41 Merced Castle to S51 Fresno Downtown	402, 406, 407, 415, 424, 425, 426	65.202	104.933	21.21	18.77
A4152	S41 Merced Castle to S52 Fresno Chandler Field	402, 406, 407, 415, 422, 420, 417, 428	65.229	104.975	21.22	18.78
A4153	S41 Merced Castle to S53 Fresno BNSF Amtrak	402, 406, 407, 429	47.609	76.619	16.41	14.37
A4154	S41 Merced Castle to S54 Fresno Airport	Not Applicable				
A4155	S41 Merced Castle to S55 Fresno East	402, 406, 407, 427,	75.315	121.207	23.97	21.30
A4156	S41 Merced Castle to S56 Fresno West	402, 406, 407, 415, 422, 420, 417, 418	61.865	99.562	20.30	17.94
A4251	S42 Merced University to S51 Fresno Downtown	406, 407, 415, 424, 425, 426	58.356	93.915	19.34	17.06
A4252	S42 Merced University to S52 Fresno Chandler Field	406, 407, 415, 422, 420, 417, 428	58.382	93.957	19.35	17.07
A4253	S42 Merced University to S53 Fresno BNSF Amtrak	406, 407, 429	40.763	65.601	14.54	12.66
A4254	S42 Merced University to S54 Fresno Airport	Not Applicable				
A4255	S42 Merced University to S55 Fresno East	406, 407, 427,	68.468	110.189	22.10	19.59
A4256	S42 Merced University to S56 Fresno West	406, 407, 415, 422, 420, 417, 418	55.019	88.544	18.43	16.23
A4351A	S43 Merced Municipal Airport to S51 Fresno Downtown via W99	408, 413, 421, 426	55.940	90.027	18.68	16.46
A4351B	S43 Merced Municipal Airport to S51 Fresno Downtown via SP	409, 414, 423, 425, 426	56.363	90.707	18.80	16.56
A4352A	S43 Merced Municipal Airport to S52 Fresno Chandler Field via W99	408, 413, 416, 417, 428	55.008	88.527	18.43	16.22
A4352B	S43 Merced Municipal Airport to S52 Fresno Chandler Field via SP9	409, 414, 419, 420, 417, 428	56.275	90.565	18.77	16.54
A4353	S43 Merced Municipal Airport to S53 Fresno BNSF Amtrak	Not Applicable				
A4354	S43 Merced Municipal Airport to S54 Fresno Airport	Not Applicable				

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A4355	S43 Merced Municipal Airport to S55 Fresno East	Not Applicable				
A4451A	S44 Merced SP Downtown to S51 Fresno Downtown via W99	410, 411, 413, 421, 426	56.169	90.395	18.74	16.51
A4451B	S44 Merced SP Downtown to S51 Fresno Downtown via SP	410, 412, 414, 423, 425, 426	55.297	88.992	18.51	16.30
A4452A	S44 Merced SP Downtown to S52 Fresno Chandler Field via W99	410, 411, 413, 416, 417, 428	55.237	88.895	18.49	16.28
A4452B	S44 Merced SP Downtown to S52 Fresno Chandler Field via SP	410, 412, 414, 419, 420, 417, 428	55.209	88.850	18.48	16.27
A4453	S44 Merced SP Downtown to S53 Fresno BNSF Amtrak	Not Applicable				
A4454	S44 Merced SP Downtown to S54 Fresno Airport	Not Applicable				
A4455	S44 Merced SP Downtown to S55 Fresno East	Not Applicable				
A4456A	S44 Merced SP Downtown to S56 Fresno West via W99	410, 411, 413, 416, 417, 418	51.873	83.481	17.57	15.44
A4456B	S44 Merced SP Downtown to S56 Fresno West via SP	410, 412, 414, 419, 420, 417, 418	51.845	83.437	17.57	15.43
A4551	S45 Merced Plainsburg to S51 Fresno Downtown	407, 415, 424, 425, 426	47.656	76.695	16.42	14.39
A4552	S45 Merced Plainsburg to S52 Fresno Chandler Field	407, 415, 422, 417, 428	47.682	76.737	16.43	14.39
A4553	S45 Merced Plainsburg to S53 Fresno BNSF Amtrak	407, 429	30.063	48.381	11.62	9.99
A4554	S45 Merced Plainsburg to S54 Fresno Airport	Not Applicable	57.768	92.969	19.18	16.91
A4555	S45 Merced Plainsburg to Fresno East	407, 427,	57.768	92.969	19.18	16.91
A4556	S45 Merced Plainsburg to S56 Fresno West	407, 415, 422, 420, 417, 418	44.319	71.324	15.51	13.55

Fresno to Tulare**STATION TO STATION ALIGNMENTS**

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A5161	S51 Fresno Downtown to S61 Visalia Airport	506, 513, 517	35.978	57.900	13.24	11.47
A5162	S51 Fresno Downtown to S62 Hanford	506, 509, 510, 514	28.848	46.426	11.29	9.68
A5163	S51 Fresno Downtown to S63 Tulare Airport	506, 513, 517, 603	47.631	76.654	16.42	14.38
A5164	S51 Fresno Downtown to S64 Tulare East County	Not Applicable				
A5165	S51 Fresno Downtown to S65 Tulare West County	506, 509, 516, 515	34.993	56.315	12.97	11.22
A5261	S52 Fresno Chandler Field to S61 Visalia Airport	504, 505, 512, 517	37.711	60.690	13.71	11.90
A5262	S52 Fresno Chandler Field to S62 Hanford	504, 507, 511, 514	29.358	47.247	11.43	9.81
A5263	S52 Fresno Chandler Field to S63 Tulare Airport	504, 505, 512, 517, 603	49.364	79.444	16.89	14.81
A5264	S52 Fresno Chandler Field to S64 Tulare East County	Not Applicable				
A5265	S52 Fresno Chandler Field to S65 Tulare West County	Not Applicable				
A5361	S53 Fresno BNSF Amtrak to S61 Visalia Airport	519, 513, 517	36.263	58.360	13.32	11.54
A5362	S53 Fresno BNSF Amtrak to S62 Hanford	519, 509, 510, 514	29.133	46.885	11.37	9.76
A5363	S53 Fresno BNSF Amtrak to S63 Tulare Airport	519, 513, 517, 603	47.916	77.113	16.49	14.45
A5364	S53 Fresno BNSF Amtrak to S64 Tulare East County	Not Applicable				
A5365	S53 Fresno BNSF Amtrak to S65 Tulare West County	Not Applicable				
A5461	S54 Fresno Airport to S61 Visalia Airport	Not Applicable				
A5462	S54 Fresno Airport to S62 Hanford	Not Applicable				
A5463	S54 Fresno Airport to S63 Tulare Airport	Not Applicable				

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A5464	S54 Fresno Airport to S64 Tulare East County	Not Applicable				
A5465	S54 Fresno Airport to S65 Tulare West County	Not Applicable				
A5561	S55 Fresno East to S61 Visalia Airport	Not Applicable				
A5562	S55 Fresno East to S62 Hanford	Not Applicable				
A5563	S55 Fresno East to S63 Tulare Airport	Not Applicable				
A5564	S55 Fresno East to S64 Tulare East County	518	38.561	62.058	13.94	12.11
A5565	S55 Fresno East to S65 Tulare West County	Not Applicable				
A5661	S56 Fresno West to S61 Visalia Airport	501, 503, 512, 517	41.030	66.031	14.62	12.73
A5662	S56 Fresno West to S62 Hanford	501, 502, 511, 514	31.646	50.929	12.06	10.38
A5663	S56 Fresno West to S63 Tulare Airport	501, 503, 512, 517, 603	52.683	84.785	17.79	15.64
A5664	S56 Fresno West to S64 Tulare East County	Not Applicable				
A5665	S56 Fresno West to S65 Tulare West County	501, 502, 508, 515	37.983	61.128	13.78	11.97

Tulare to Bakersfield

STATION TO STATION ALIGNMENTS

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A6171	S61 Visalia Airport to S71 Bakersfield Truxton	603, 605, 606, 613, 701, 706	71.067	114.371	22.81	20.24
A6172	S61 Visalia Airport to S72 Bakersfield Golden State	603, 605, 606, 613, 701	69.226	111.408	22.31	19.78
A6173	S61 Visalia Airport to S73 Bakersfield Airport	603, 605, 606, 613	64.229	103.367	20.94	18.53
A6174	S61 Visalia Airport to S74 Bakersfield West	603, 605, 606, 607, 610	66.175	106.499	21.47	19.02
A6175	S61 Visalia Airport to S75 Bakersfield East	603, 605, 606, 613, 701, 702, 704	77.048	123.997	24.44	21.73
A6176	S61 Visalia Airport to S76 Bakersfield Old Amtrak	Not Applicable				
A6177	S61 Visalia Airport to S77 Bakersfield South	603, 605, 606, 607, 610, 708	79.670	128.217	25.15	22.39
A6271	S62 Hanford to S71 Bakersfield Truxton	601, 612, 707	81.700	131.483	25.71	22.90
A6272	S62 Hanford to S72 Bakersfield Golden State	Not Applicable				
A6273	S62 Hanford to S73 Bakersfield Airport	Not Applicable				
A6274	S62 Hanford to S74 Bakersfield West	601, 611, 610	73.306	117.974	23.42	20.80
A6275	S62 Hanford to S75 Bakersfield East	601, 612, 707, 724, 704	88.113	141.805	27.46	24.50
A6276	S62 Hanford to S76 Bakersfield Old Amtrak	601, 612	80.246	129.144	25.31	22.53
A6277	S62 Hanford to S77 Bakersfield South	601, 611, 610, 708	86.801	139.692	27.10	24.17
A6371	S63 Tulare Airport to S71 Bakersfield Truxton	605, 606, 613, 701, 706	59.414	95.617	19.63	17.33
A6372	S63 Tulare Airport to S72 Bakersfield Golden State	605, 606, 613, 701	57.573	92.654	19.13	16.87
A6373	S63 Tulare Airport to S73 Bakersfield Airport	605, 606, 613	52.576	84.613	17.76	15.62
A6374	S63 Tulare Airport to S74 Bakersfield West	605, 606, 607, 610	54.522	87.745	18.30	16.10

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A6375	S63 Tulare Airport to S75 Bakersfield East	605, 606, 613, 701, 702, , 704	65.395	105.243	21.26	18.82
A6376	S63 Tulare Airport to S76 Bakersfield Old Amtrak	Not Applicable				
A6377	S63 Tulare Airport to S77 Bakersfield South	605, 606, 607, 610, 708	68.017	109.463	21.98	19.48
A6471	S64 Tulare East County to S71 Bakersfield Truxton	604, 606, 613, 701, 706	71.574	115.186	22.95	20.37
A6472	S64 Tulare East County to S72 Bakersfield Golden State	604, 606, 613, 701	69.732	112.223	22.44	19.91
A6473	S64 Tulare East County to S73 Bakersfield Airport	604, 606, 613	64.736	104.182	21.08	18.66
A6474	S64 Tulare East County to S74 Bakersfield West	604, 606, 607, 610	66.682	107.314	21.61	19.14
A6475	S64 Tulare East County to S75 Bakersfield East	604, 606, 613, 701, 702, 704	77.555	124.812	24.58	21.86
A6476	S64 Tulare East County to S76 Bakersfield Old Amtrak	Not Applicable				
A6477	S64 Tulare East County to S77 Bakersfield South	604, 606, 607, 610, 708	80.177	129.033	25.29	22.52
A6571	S65 Tulare West County to S71 Bakersfield Truxton	602, 608, 613, 701, 706	71.898	115.708	23.03	20.45
A6572	S65 Tulare West County to S72 Bakersfield Golden State	602, 608, 613, 701	70.056	112.745	22.53	19.99
A6573	S65 Tulare West County to S73 Bakersfield Airport	602, 608, 613	65.060	104.704	21.17	18.74
A6574	S65 Tulare West County to S74 Bakersfield West	602, 609, 610	67.641	108.858	21.87	19.38
A6575	S65 Tulare West County to S75 Bakersfield East	602, 608, 613, 701, 702, 704	77.879	125.334	24.67	21.94
A6576	S65 Tulare West County to S76 Bakersfield Old Amtrak	Not Applicable				
A6577	S65 Tulare West County to S77 Bakersfield South	602, 609, 610, 708	81.136	130.576	25.55	22.76

Bakersfield to Los Angeles Connection

STATION TO STATION ALIGNMENTS

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A7181	S71 Bakersfield Truxton to Grapevine Connection	709, 713, 720	26.460	42.584	9.11	7.98
A7182	S71 Bakersfield Truxton to Comanche Connection	709, 714, 715, 716, 722	32.288	51.962	10.70	9.43
A7183	S71 Bakersfield Truxton to Mojave Connection	724, 704, 705	13.390	21.549	5.55	4.71
A7281	S72 Bakersfield Golden State to Grapevine Connection	702, 710, 718, 721	31.192	50.198	10.40	9.16
A7282	S72 Bakersfield Golden State to Comanche Connection	702, 710, 718, 722	35.601	57.294	11.61	10.26
A7283	S72 Bakersfield Golden State to Mojave Connection	702, 704, 705	14.799	23.816	5.93	5.06
A7381	S73 Bakersfield Airport to Grapevine Connection	701, 706, 709, 713, 720	33.298	53.588	10.98	9.69
A7382	S73 Bakersfield Airport to Comanche Connection	701, 702, 710, 718, 722	40.597	65.335	12.97	11.51
A7383	S73 Bakersfield Airport to Mojave Connection	701, 702, 704, 705	19.795	31.857	7.30	6.31
A7481	S74 Bakersfield West to Grapevine Connection	708, 711, 720	31.883	51.310	10.59	9.33
A7482	S74 Bakersfield West to Comanche Connection	708, 712, 715, 716, 722	38.121	61.350	12.29	10.89
A7483	S74 Bakersfield West to Mojave Connection	Not Applicable				
A7581	S75 Bakersfield East to Grapevine Connection	Not Applicable				
A7582	S75 Bakersfield East to Comanche Connection	Not Applicable				
A7583*	S75 Bakersfield East to Mojave Connection	705	6.976	11.227	3.71	3.11
A7681	S76 Bakersfield Old Amtrak to Grapevine Connection	707, 724, 710, 718, 721	31.236	50.270	10.42	9.17
A7682	S76 Bakersfield Old Amtrak to Comanche Connection	707, 724, 710, 718, 722	35.646	57.366	11.62	10.27
A7683	S76 Bakersfield Old Amtrak to Mojave Connection	Not Applicable				

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE		TIME VHS (minutes)	TIME MAGLEV (minutes)
			(miles)	(kilometers)		
A7781	S77 Bakersfield South to Grapevine Connection	711, 720	18.388	29.592	6.91	5.96
A7782	S77 Bakersfield South to Comanche Connection	712, 715, 716, 722	24.626	39.632	8.61	7.52
A7783	S77 Bakersfield South to Mojave Connection	Not Applicable				

* For VHS, train is still accelerating towards full speed. Speed at end of segment 705 is: 189.94 mph

Central Valley

High-Speed Through Routes

ALIGNMENT NUMBER	ALIGNMENT ROUTE SEGMENTS	LINE SEGMENTS	TOTAL DISTANCE (miles) (kilometers)		TIME VHS (minutes)	TIME MAGLEV (minutes)
Sacramento						
H1001	SP River/ WP / EHS	101, 120, 103, 106, 109, 111	46.698	75.153	14.63	13.04
H1002	WP / EHS	104, 106, 109, 111	43.646	70.241	13.80	12.27
H1003	SP EHS	105, 118, 107, 110, 111	45.177	72.706	17.30	15.84
H1004	SP CCT EHS	105, 119, 108, 110, 111	46.975	75.599	17.79	16.28
Stockton						
H2001	EHS W99	202, 209, 211	27.253	43.860	7.43	6.81
H2002	EHS BN	202, 207, 208, 210, 214, 218, 219	34.505	55.531	9.41	8.63
H2003	EHS BN E99	202, 207, 208, 210, 214, 217, 222	32.639	52.528	8.90	8.16
Modesto						
H3001	W99	301, 305, 308, 309	40.154	64.622	10.95	10.04
H3002	W99 SP W99	301, 312, 313, 311	41.705	67.117	11.37	10.43
H3003	BN W99	307, 316, 404, 405	31.508	50.708	8.59	7.88
H3004	E99 W99	306, 318, 403, 404, 405	31.475	50.654	8.58	7.87
H3005	E99	306, 318, 402, 406,	40.536	65.236	11.06	10.13
H3006	E99	306, 318	22.989	36.998	6.27	5.75
H3007	E99	306, 318, 402	29.836	48.016	8.14	7.46
Merced						
H4001	W99	408, 413, 416, 417, 418	51.644	83.113	14.08	12.91
H4002	W99 SP W99	409, 414, 419, 420, 417, 418	52.911	85.152	14.43	13.23
H4003	BN W99	407, 415, 422, 420, 417, 418	44.319	71.324	12.09	11.08
H4004	BN W99	407, 427	57.768	92.969	15.75	14.44
H4005	E99 W99	403, 404, 405, 408, 413, 416, 417, 418	60.130	96.769	16.40	15.03
H4006	BN E99	406, 407, 427	68.468	110.189	18.67	17.12

Fresno						
H5001	W99 BN	501, 502, 511, 514	31.646	50.929	8.63	7.91
H5002	W99	501, 502, 508, 515	37.983	61.128	10.36	9.50
H5003	W99 SP	501, 503, 512, 517	41.030	66.031	11.19	10.26
H5004	E99	518	38.561	62.058	10.52	9.64
Hanford/Visalia/Tulare						
H6001	BN W99	601, 611, 610	73.306	117.974	19.99	18.33
H6002	W99	602, 609, 610	67.641	108.858	18.45	16.91
H6003	W99 SP	602, 608, 613, 701	70.056	112.745	19.11	17.51
H6004	SP	603, 605, 606, 613, 701	69.226	111.408	18.88	17.31
H6005	SP W99	603, 605, 606, 607, 610	66.175	106.499	18.05	16.54
H6006	E99 SP	604, 606, 613, 701	69.732	112.223	19.02	17.43
Bakersfield						
H7001	W99 Grapevine	708, 711, 720	31.883	51.310	8.70	7.97
H7002	W99 Comanche	708, 712, 715, 716, 722	38.121	61.350	10.40	9.53
H7003	Union I-5	706, 709, 713, 720	28.302	45.547	7.72	7.08
H7004	Union Comanche	706, 709, 714, 715, 716, 722	34.129	54.925	9.31	8.53
H7005	SP BN Grapevine	702, 710, 718, 721	31.192	50.198	8.51	7.80
H7006	UP BN Comanche	702, 710, 718, 722	35.601	57.294	9.71	8.90
H7007	UP Mojave	702, 704, 705	14.799	23.816	4.04	3.70
To Los Angeles						

Assumptions:

1. Alignments from Terminal Station S11 (Sacramento) to Stockton includes acceleration time to full speed.
2. Travel times for alignments from Terminal Station S11 (Sacramento) that contain Line Segment 105 include a maximum running speed of 62 mph along Line Segment 105; acceleration from 62 mph to full speed continues beginning with Line Segment 118.
3. Full speed on alignments from Stockton through Bakersfield - no deceleration.